The Engineering and Mining Journal

VOL. LXXXVI. NEW YORK, OCTOBER 10, 1908. NO. 15.

Dredging for Platinum in the Urals, Russia

The Richer Deposits Are Becoming Exhausted and the Gravels Too Poor to Be Worked by Hand Await Development of an Efficient Dredge

BY L. TOVEY*

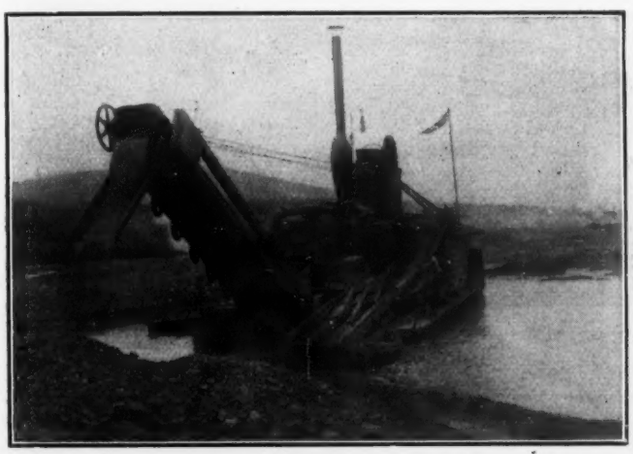
Platinum mining in the Urals is carried on more extensively in two separate fields, the Nijni Tagilsk district on the river Martjan, a secondary tributary to the Tchusowaja in the estates of Demidoff, Prince San Donato, and on the river Iss tributary to the Tura falling into the Tobol. The Tura itself is a platiniferous stream below the mouth of the Iss. Other smaller districts of inferior importance are being opened up to the north on the eastern slope of the Urals, but as yet mining has not attained any serious scale there. However, there is every reason to expect that in the near future a good many of the new districts will come into importance.

All the platinum is produced from gravel deposits; the only primary deposit is in a patch of olivine rock with chromic iron near the principal camp of the Demidoff mines and is not worked. However, the administration of the Demidoff estates is beginning to realize the importance of finding the source of the rich placers which are to a certain degree exhausted, and is trying to solve this question.

The character of the platinum deposits and their relation to the country rock has been the object of work by the Comité Géologique. N. K. Wyssotzki has spent several summer seasons in field work on the Iss and the Martjan; he published a preliminary report in 1903 and his final report covering later field work is expected shortly.

As the geological conditions have been the object of important work by J. F. Kemp, DuParc and others, geological details will be omitted here.

The Demidoff placers are worked on a very large scale. All along the Martjan



WERF CONRAD DREDGE WITH PERRET SCREEN

ALW. TAATZ VALERIANOWSKI DREDGE

BUCYRUS POUTILOFF DREDGE

BUCYRUS POUTILOFF DREDGE CUTTING THREA DAM

*Mining engineer, Tomsk, Siberia.

for a distance of about 15 *versts* (kilometers) platiniferous gravel is washed on stationary plants of the common Urals type, employing the *botchka*, or conical revolving screen, the *tchasha*, or puddling machine with a bottom of perforated iron plates, or the *boronka*. Details of these operations may be found in *Trans.* A. I. M. E., Vol. XXIX, in a paper by C. W. Purington, and in the *Leoben & Pribram Jahrbuch* for 1902 (Bd. 4, Heft. 3) in a paper by L. St. Rainer. The metal from the Martjan is dark and magnetic. The output in 1907 was about 28,750 ounces.

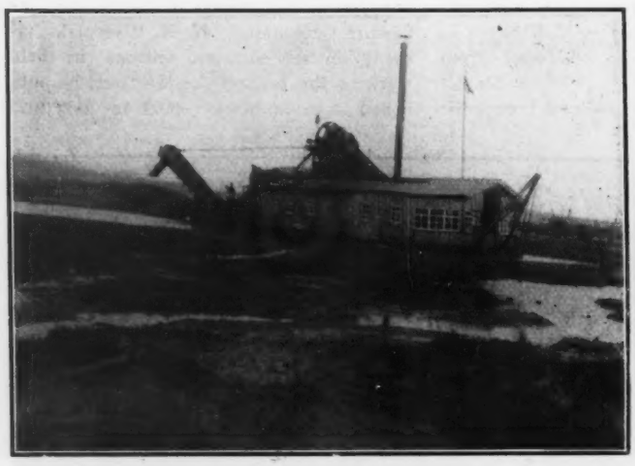
the whole poorer deposit is left unworked. To work these remaining gravels the best means is a dredge, and the administration of the Demidoff estates has been negotiating with the Poutiloff Works, of St. Petersburg, about building a powerful dredge of the Bucyrus type, and also with some English firms.

More important than the Martjan deposits are those on the streams Iss and the Wyia, tributaries to the Tura in the Goroblagodatski district. The upper part of the Iss with its tributaries belongs to the properties of Count Shouvaloff and is an important producer of platinum. The

average output of the whole estate for the last year has been between 75 and 90 poods, or about 39,560 to 47,500 ounces.

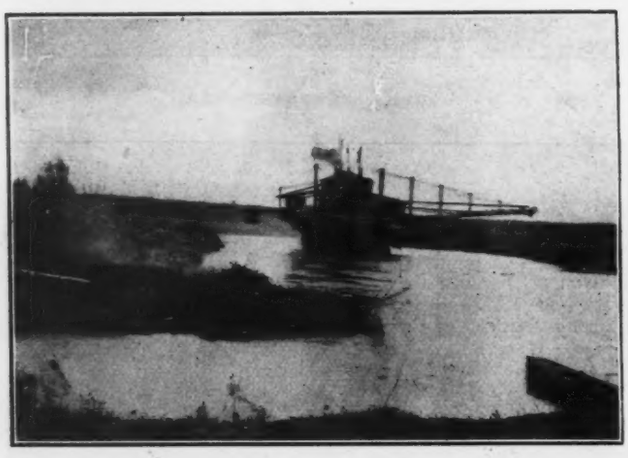
Dredging Practice

The Werf Conrad boats, built by a firm of Haarlem, Holland, have, on the whole, been successful, but still they do not form the most important part of the washing plant. Their output in 1907 was 3757 oz., or less than 10 per cent. of the whole. The operation of these dredges is very satisfactory; the 4-ft. boats have engines of only 65 h.p., and the 260,000 cu.yd. of gravel that have yielded the

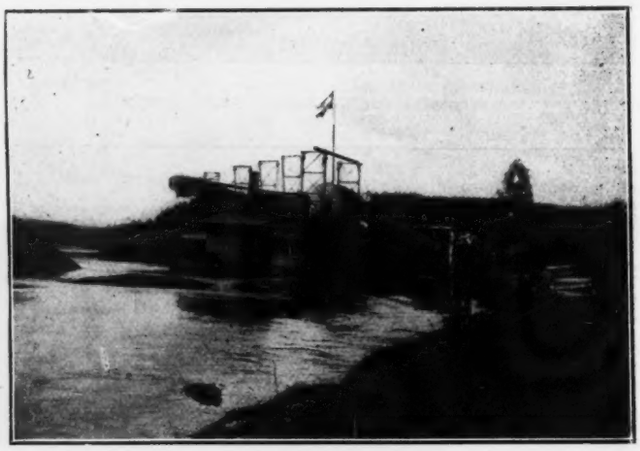


WERF CONRAD DREDGE, COUNT SHOUVALOFF

BORONKA WASHING PLANT



WERF CONRAD WASHING DREDGE



WERF CONRAD STRIPPING DREDGE

Methods of Operation

The richer portions of the deposit have been worked out. Some parts are at present worked by small groups, sometimes by families of workmen, or *starateli*, who get from the owners small patches of the gravel deposit and wash it on a kind of long tom. The water is usually pumped from the stream or pond. The work of washing is usually done by women while the men break the gravel from the bank. As this kind of work can be carried on only where water is not abundant in the deposit, a good part of

gravels are formed of the different varieties of olivine rock cropping out on the upper Iss in two high mountains, Saranoraja and Katchanar, large masses of diallage and gabbro. N. Wyssotzki calls special attention to two minor hills, the Svetli and Veressovoi Bor, containing large masses of dunite, the source of the precious metal. The main deposit is in the bed and banks of the present stream Iss and its tributaries, and is worked by open cuts and stationary washing plants, and also by two Werf Conrad dredges with Perret patent revolving screens. The

above quantity of metal in 1907 have been measured in the bank; consequently the figures are reliable. The dredging conditions are more or less favorable, the depth of dredging being about 2.40 *sagenes*, or about 17 ft., and the deposit being uniform and without great boulders.

The dredges were designed by the manager, L. A. Perret, a Russian mining engineer, who, in the early nineties, was sent by the government to New Zealand and Australia, and is now one of the leading authorities on dredging. The distinguishing feature of these dredges is the

Perret conical revolving screen made up of 1¼x⅝-in. steel bars. The slots between the bars are from ⅝ to ⅞ in. This kind of screen presents certain advantages over the punched iron screen, the working area being much greater. Also the efficiency of the screen is somewhat increased by the action of the sharp edges of the bars against the gravel. When any of the bars are worn out they are easily replaced; they are held in place between two hoops, one of which has grooves to fit the ends of the bars. The water is introduced under pressure into the inside of the screen from a central pipe, which forms a casing concentric with the shaft of the screen. The shaft and the casing revolve with the screen. The casing has apertures for the water distributed over the entire surface; consequently jets of water work against all parts of the inner surface of the screen and not merely against the side which carries the gravel upward. Other jets of water play upon the outer surface of the screen and keep it clean.

The fine sand and metal fall through the slots of the screen on a long table covered with mats of local manufacture covered with wire cloth. The lower part of the table is covered with riffles, which are taken off for the clean-up. The inclination of the tables is one in ten and is somewhat increased under the screen. The loss of platinum in the tailings is reported to be quite insignificant. Fresh water for the boiler is brought in a small boat from a small stream flowing into the Iss a short distance from the present site of the dredge. The hull of the boat is of iron.

The results of work of the dredges for 1907 have been very good. Dredge No. 1 has worked 114 days at an average of 16.82 hours per day, handling 80.96 cubic *sagencs*, or 1028 cu.yd. of gravel and producing one pound 15 *zolotniks*, or about 15.5 oz. of platinum. The whole output for the year was 9226 cubic *sagenes*, or 117,268 cu.yd. of gravel and 3 *poods* 11 pounds 80 *zolotniks*, or about 1735 oz. of platinum. The results of the work of dredge No. 2 were still more satisfactory. It worked for 135 days at a daily average of 18.26 hours, handling 1058 cu.yd. of gravel and producing 24.15 oz. of platinum. The whole output for the year was 2022 oz. platinum.

Dredging is usually begun about the last of April or the first of May, and is continued to early October. No doubt the dredging season could be made longer if trials were made in this direction. At present the dredges represent only a small part of the operations and are closed down with the rest of the plants when washing the gravel from the open cuts becomes difficult. In other mines lower down the Iss and the Tura the working season is longer, for the climate is milder.

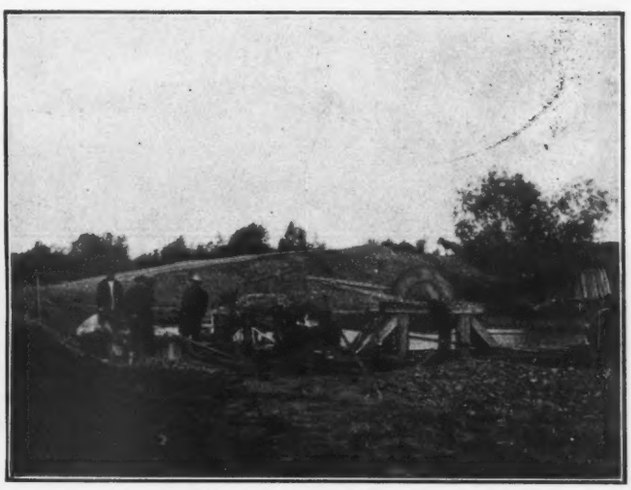
Compagnie Industrielle du Platine

The next property down the Iss is that of the Compagnie Industrielle du Platine, the largest producer of platinum in the world. Besides the properties on the Iss it owns claims on the Wyia, another tributary to the Tura, and a good many claims on the Tura itself below the mouth of the Iss. In October, 1907, it bought up the property of the Turinski Platinum Company and in the spring of 1908 a controlling interest in the company, "Platina," formed by Moscow banks. The average production of the Compagnie Industrielle has been between 125 and 150 poods.

In 1907 the placers were worked by open cuts with manual labor, the haulage being done in cars drawn by horses and only raised up the incline to the washing

ALW. TAATZ PROSPECTING DREDGE

LONG TOM WASHING



PUMPING AT A PROSPECTING PIT

screen by means of an endless rope driven by the main engine of the plant.

The washing plants included five *butaras* (conical screens) eight *boronkas* and two sluices. These washing plants have been described by Purington and Rainer.

The only alteration introduced of late has been a combination of the *butara* and *boronka,* the coarse gravel and clay passing from the revolving screen to the *boronka,* a kind of concave screen bent to about a quarter of a circle, on which the stones and clay are rubbed by a sort of double rake run from the main engine. The clay and fine sand separated from the boulders pass to a small table under the *boronka* screen. The main revolving screen *butara* is usually 16 to 19 ft. long with diameters of 5½ and 7 ft. The holes in the iron plates of the screen are ⅛, 5/16 and ¾ in. and the plates are 5/16 in. thick. In one of the plants there is a combination of this screen with the Perret bar screen which does the preliminary washing. The power required for each screen at 20 to 23 r.p.m. is usually 8 h.p. The water is pumped from the river by centrifugal pumps. The larger plants have usually one horizontal engine of about 75 h.p. running the washing-plant pump and endless-rope haulage of the gravel to the screen and the tailings to the dump.

One of the accompanying illustrations shows one of the more important cuts of the company on the Staritchini and Bogajavlenski claims. The bed of the river is drained and the river turned off into an artificial canal. The open cut is drained by a ditch timbered with wood. This cut is worked by convicts. As the deposit is shallow prospecting is done by small shafts timbered with upright poles. The depth not exceeding 14 to 16 ft., the work is rather easy; the pumping is done by simple Letestu pumps run by a small portable gas engine.

Besides such open cuts the company works some small drifts in the benches of the Iss and its small tributaries. The gravel from the drifts is washed on sluices with a flat screen at the head. The gravel is dumped on this screen and puddled with rakes by six to eight girls standing at the sides of the screen. The fines are washed on the tables under the screens.

Working Poorer Deposits

Since these methods of working are rather expensive, only the richer portions of the deposit can stand the costs. When these are worked out the company will be compelled to work the poorer parts of the river by more efficient mechanical methods. Experiments with this end in view have been carried on since 1901 and 1902, when M. Mongolfier put up two dredges which are still working on the Troitzki and Anno Tonifowski claims. According to Saytzeff, the overburden here was about 14 ft. thick, and the pay gravel from 4½ to 6 ft.; the average depth of dredging is about 16 to 17 ft. These natural conditions caused the company to adopt a special method of mining, i.e., the employment of two dredges, one to strip the overburden, the second to wash the gravel. As the overburden is about three times as thick as the pay gravel, the capacity of the stripping dredge is about three times that of the washing dredge. The dredges were not specially constructed for mining purposes, but were bought at the sale of the Kiel canal excavating machinery; this accounts for some of the defects of the machines.

The stripping dredge has buckets of more than 9 cu.ft., running at a speed of 7 to 10 buckets per minute. The main compound engine is 70 h.p., that of the conveying belt 15 h.p., and the winches 5 h.p. The boiler is 90 h.p. The utmost capacity of the dredge is 2033 cu.yd. per 24 hours. The ground excavated is carried by a conveying belt to the side of the cut where it is dumped. The whole of the placer is worked out by successive cuts parallel to each other. After the stripping dredge has opened the pay gravel in the first cut the washing dredge follows and takes the gravel to the bedrock. In the meantime the stripping dredge takes the second cut and by means of the conveying belt dumps the overburden into the cut made by the washing dredge. As the conveying belt is perpendicular to the direction of the bucket ladder in both dredges, the dumps are more or less uniform. The conveying belt is counterbalanced by a box filled with stones. This work by parallel cuts suits the local conditions, for the deposit is very wide, in some places more than 1000 feet.

The washing dredge is much smaller, the buckets having a capacity of about 4½ cu.ft., running at a speed of 7 to 10 buckets per minute. The power is supplied by two 45-h.p. engines, one running the revolving screen and pump, the other the buckets and conveying belt. The winches and the dynamo for lighting take about 5 h.p. each; the capacity is about 762 cu.yd. per 24 hours. Each of the dredges requires 11 men per shift.

The large number of men is needed because of the antiquated construction of the boat, especially the winches, the operation of which requires three men besides the dredge master. Two men are in charge of the conveying belt, three men at the engines and boiler, one man at the ladder, and one helper for handling the fuel. Such work can be carried on only with the low labor prices prevailing in the Urals, not exceeding 50c. for laborers and $1.25 to $1.50 for skilled workmen. The main defect of the work is the enormous amount of time spent on repairs, etc.; the average daily work does not amount to more than 10 hours. The average daily capacity of the dredge for the 206 working days of the season of 1907 was about 297 cu.yd. The total production for 1907 was about 61,449 cu.yd. of gravel and about 1230 oz. of platinum. Such work is possible only when the prices for platinum are as high as they were in 1907, and is

OPEN CUT, BOGAJAVLENSKI AND STARITCHINI CLAIMS

WASHING PLANT ON THE ISS, COUNT SHOUVALOFF ESTATE

quite unsatisfactory when compared not only with American practice, but also with that of the other Russian dredges. It may be accounted for by the fact that the washing dredge was not specially designed for mining purposes, and was adapted for this service at the mines. Considering the inadequate mechanical equipment of the repair shops, these results are no more than might have been expected.

Improved Design

This unfortunate experience warned the managers against weak and inadequate machinery, and they decided to build the next dredge according to the local requirements. A new 4-ft. dredge began operations in July, 1907, and during the trial days, which lasted with considerable intervals for alterations to the close of the season, it worked 16,556 cu.yd. of gravel recovering about 145 oz. of platinum. A good part of the operations was stripping work. The dredge was constructed by Alw. Taatz, a German firm of Halle a. Saale, willing to adapt itself to the requirements of the company.

The results can be seen in the accompanying illustrations, which prove the dredge to be something not quite ordinary. The iron hull has on the sides iron cylinders intended to increase the flotation capacity of the boat. This makes the hull much too wide and very unwieldy, and the idea must be considered queer in any case. The main gantry is somewhat higher than the washing plant requires. The washing is done by the usual revolving screen and tables. In general the whole dredge exhibits a somewhat experimental character. The Valerianowski claim on the Wyia on which this dredge is working, was chosen for the test with good judgment; the gravel is easy to wash and without large boulders, and the whole depth of the cut to the bedrock is about 16 to 17 ft. The bedrock is soft and easily excavated by the buckets.

The company, it is reported, intends to build more dredges, and has increased its staff of mechanical engineers who are expected to build the dredges at the mines. This seems to be rather an unfortunate plan, for the equipment of even very good repair shops cannot be compared with that of large works like the Poutiloff or Bucyrus. However, the local engineers hope to install home-made dredges considerably more cheaply than those built by special firms. One of the inducements for the adoption of this plan is that the company owns a number of 75-h.p. engines working at present at the old stationary plants washing the gravel from the open cuts. Since these workings are expected to be worked out in the near future the engines will be available for the dredges that will have to work the remaining poorer parts of the deposits. This plan gives a certain saving on the cost of the initial equipment but it is yet a serious question if this comparatively small economy will not cause considerable loss on account of smaller capacity and longer time for repairs, which has been the chief defect in the work of the first dredges. As has been stated the new dredge which the company has been building at the Valerianowski mine even with the coöperation of Alw. Taatz is not very encouraging for a beginning.

Prospecting Dredge

The third dredge owned by the company is a small 1½-cu.ft. prospecting boat built also by Alw. Taatz company. It was built independently from local directions and seems to be a rather handy and useful little machine. It worked in 1907 on the river Tura in order to prospect the claims intended to be worked later by more powerful dredges. Like the other dredges of the company it has been somewhat mismanaged and gives for ten hours' daily work the total capacity of about 74 cu.yd. The production for 1907 was 16,207 cu.yd. and 342 oz. of platinum.

The idea of prospecting the river Tura by means of small dredges is not a new one. Such prospecting has been done for years by small dipper dredges worked by hand and described by Purington, Levat and others. Prospecting with the dredge has not been carried on very extensively; it worked all the time in one place, giving no results as a prospector and quite inferior results as a producer of platinum. For the next season the dredge was to be taken to the Iss to work some of the placers in its small tributaries too poor for hand work and too small for a large dredge. This might be a good way of using the dredge and in every way a useful and interesting experiment. The transport of the hull is easy for it is made up of parts bolted together and can be taken to pieces in a very short time and again assembled with rubber in the seams. However, one must not forget that with cheap labor and the possibility of employing whole families working on tribute (*starateli*) the competition will be rather hard for the dredge if it continues working at the rate it has done thus far.

Dredge of the Turinski Company

The nearest neighbor of the small dredge just described is a 3½-ft. boat, the strongest on the Tura river and built for the Turinski Platinum Mining Company by the Poutiloff Works after the Bucyrus type, with some alterations introduced according to the requirements of the purchaser and the conditions of the deposits of the Jerusalimski mine which it works. These modifications have not been very successful and at present the Poutiloff Works seems to be more cautious; it builds special dredges according to the miner's ideas, sometimes more peculiar than brilliant, and prefers to follow the standard type described in the *London Mining Journal* of May 30, 1908, which has proved very successful in all the conditions in which it has been tried.

The chief features of the Jerusalimski dredge are a revolving screen made of strong steel bars for preliminary washing and separating the boulders from the gravel, and two puddling machines for washing the rest of the gravel supposed to have a great amount of tough clay very hard to wash. The original idea of the first owner of the mine M. Imshenetki and of M. Ritoff who designed the puddling machines was to run them by turns, filling one then turning the gravel to the second and washing the gravel in the first as long as necessary for the pebbles to become quite free from clay, then opening a trap in the flat horizontal screen forming the bottom of the puddling machine and dropping the pebbles into a chute to the conveying belt. The fines passing the screen of the machines fell on the usual washing tables. Closing the trap was, however, very difficult and later on the puddling machines worked with an open trap. This made it possible to run both machines without interruption and consequently largely increase their capacity, as one turn of the material in the pan of the machine was sufficient to wash the stones quite clean enough.

The puddling of the gravel was effected by means of vertical stamps suspended on hinges from radial arms fixed to a central revolving vertical shaft. When the shoes of the stamps would encounter a large stone they could rise on the hinges and pass over the stone. At 18 to 20 r.p.m. the centrifugal force developed was very great and caused small stones to fly over the sides of the pans of the puddling machine.

The Present Simplified Dredge

At present the claims of the Turinski company have been sold to the Compagnie Industrielle du Platine and the dredge is being altered according to the results of former work. Instead of the complicated puddling machines it will have the usual revolving screen, which is quite efficient enough for the local gravel. It cannot be denied that this dredge is at present the strongest and best adapted for mining work owned by the Compagnie Industrielle, and is bound to give good results unless the changes introduced this summer will maim it as it was maimed last year by inefficient management.

Late in the autumn of 1907 the Poutiloff works added to the successful gold-dredging boat on the Irdel, two very good 5½-ft. dredges to work in the north of the Urals. One of them working on the Solva river is a producer of platinum. Unhappily I have not had the chance to see them and hope to give an account of their work later on. The universal opinion is very much in favor of these boats; they have proved very powerful, are of the standard type and wash the gravel very clean.

Metallic Mineral Resources of the Philippines *

By Maurice Goodman†

The present article is intended to be a summary of recent discoveries and developments, and does not supersede, but rather supplements, the former publications of the Mining Bureau.

Gold

Gold is easily the first in importance of the metallic mineral resources of the Philippines. It has been sought for and found in most of the provinces of the Archipelago, but Benguet, Masbate, and Ambos Camarines are rivals for first place in the metal output and in general mining activity. Numerous claims have been located in these provinces and several corporations have lately been organized to develop and operate a number of the more important groups. The success of some of the companies which have entered the field is yet in doubt, while that of others, to judge from their continuous operation and constant output, might naturally be considered assured. There are other corporations which have not yet attempted to break into the producer class, but have exerted their energies toward developing their properties and blocking out ore.

Two new stamp mills have recently been imported into the Islands. One, a Hendy quadruple-discharge six-stamp mill, will be erected in Benguet, and the other, a 10-stamp mill of the Risdon type, has been set up in Masbate. On the other hand, a 10 and a five-stamp mill have been shut down in Masbate, so that the prospects for an increased output this year seem doubtful. However, new discoveries have been made which promise well for the future. At Binanlonan, in the northern part of Pangasinan, some rich but narrow veins of free-milling ore have been discovered and at least two companies are engaged in active exploration work in that field. Unfortunately, internal dissensions have been interfering with rapid progress in this district.

The island of Marinduque also offers a new, but small, field for the prospector. Recent discoveries conclusively prove the presence of gold-bearing veins, and while no bonanzas have been encountered the company most active in prospecting the district declares itself well satisfied with the showing thus far made and is prepared, should the prospects continue favorable, to open up and develop its properties on a larger scale.

The gold-mining industry in the northern Camarines has been showing signs of awakened interest. While this is more true of placer than of quartz properties, the latter have recently been the subject of negotiations which have been successfully concluded, and mining operations here have been resumed. These properties are reported to have yielded much rich ore in the past and were the only mines operated with an approach to modern methods during the Spanish régime. For various reasons these mines were abandoned and are today in such a condition that it will require a considerable expenditure of money to put them in working shape. The most recent information received is that the dredge erected about May 1 of last year is yielding returns, and several quartz prospects are being opened up.

The most interesting and probably most important of the recent discoveries of gold, was made in the Suyoc region of southern Lepanto, where the Igorots have been working and washing gold ore by the most primitive methods for a hundred years or more. Many years ago they were driven out of their richest diggings by water, as, because of the topography of the country, they could not work these placers by their usual method. An American prospector by means of a drainage tunnel has recently removed the water from one of these flooded workings and found the rich ore which tradition reported to be present. A silvery, white mineral since identified as calaverite was observed in association with the free gold, this being the first authentic report of the occurrence of telluride of gold in the Philippines. No report as to the extent of the deposit or the average assay value of the ore has yet been made.

No great amount of bullion was produced during the past year from the placer deposits of the Philippines. One dredge has but recently arrived at its real working field, having been engaged heretofore in making its way through comparatively poor and more or less barren ground. A New Zealand syndicate imported a gold dredge last year which has since been put together and floated in the Paracale river. Another dredge, which is now lying idle in Masbate, may be transferred to the Camarines in the near future to assist in the exploitation of this rich field.

In Nueva Ecija, ditches and flumes have been constructed and everything is prepared for a profitable sluicing campaign during the coming rainy season. Considerable prospecting has been done during the past year in the placer field of northern Surigao, but no extensive mining operations have yet been undertaken.

Copper

Scarcely a dollar's worth of copper has been produced in these Islands since American occupation. Nevertheless, this metal is conceded to rank next to gold in importance as a natural asset of the Philippines. It holds this position both because of its past record, and of its widespread occurrence throughout the Islands, being a frequent associate of gold in the ores. The non-production of copper of late years must necessarily be attributed to the absence of smelters in the Islands and to the difficulties of transportation from the mountain regions where the ore has been found, to the nearest port from which the product could be shipped to foreign smelters. With the investment of a moderate amount of capital these difficulties could be overcome, either by the erection of a furnace near the mines or the improvement of transportation facilities. The Mancayan copper mines, which are the most important and best known copper deposits in the Philippines, have lately come under the control of a local syndicate composed of American and English capitalists. This company has applied for and obtained a franchise to build a railroad from Mancayan to Bangar, a town on the western coast of Luzon. If this road is built, a most important step toward the upbuilding of the mineral industry of the Philippines will have been taken, for not only is such a road of prime importance to the interests of the copper company, but all of the gold mines of Suyoc and northern Benguet will be benefited by it. The Mancayan property is now being thoroughly examined by a mining engineer from the United States.

Promising specimens of the carbonate ores from eastern Pangasinan have recently come to the Bureau, but no authentic reports have yet been received concerning the extent of the deposits. Similar specimens, but no more data, have been recorded from Cagayan de Misamis. Large bowlders of chalcocite float, carrying appreciable quantities of gold and silver, have been encountered in Marinduque, but up to the present time the mother lode has not been discovered. Native copper occurring as a very thin stringer in igneous rock has been discovered in Masbate, and rich carbonate ores carrying gold and silver have been found in the same region.

Silver

Native silver has been obtained only from one of the Suyoc mines, a short distance from where the telluride of gold was discovered. Some rich assays of this ore have been made. As an associate of gold it is encountered in many ores, but in most of them it occurs only in inappreciable quantities. It has been found with lead in the argentiferous galena of Marinduque and Cebu, running over 11 oz. per ton in the former, while in the latter the proportion is unknown, although it is reported to be high.

Lead

No development work was performed on any of the lead deposits of the Philippines during the last year. The outcrops

*Abstract from "The Mineral Resources of the Philippine Islands." Issued by the Bureau of Science, Manila, 1908.

†Mining engineer to the Bureau of Science, Manila, Philippine Islands.

in Marinduque and Cebu were visited by representatives of the mining division of this Bureau, but the lack of development work made it impossible to formulate a conclusive report upon the probable importance of these deposits. A few of the gold ores of the Islands contain a sufficiently high percentage of galena to make it a factor in the estimation of the smelting cost. Large specimens of galena float were found in conjunction with those of chalcocite mentioned above. In Cebu the galena occurs as a stockwerk, in or closely associated with an andesite flow.

Iron

No new developments have taken place in the iron industry of the Philippines during the past year. In the Angat region an improvement in the conditions was caused by the termination of the legal disputes which had been causing more or less molestation to the operators for the last four or five years. An increased economy and possible output may follow as a result of this settlement, but no new discoveries or modifications of the methods employed are reported. The new wagon road being built between San Miguel de Mayumo and Sibul may give an impetus to the iron smelters of that district, as it will permit greater economy in the cost of transportation to the railroad. This has always been one of the largest expenses in this region. Iron ore has been discovered in Marinduque, but under conditions which render an iron industry unlikely in that island within the near future. Iron ore carrying manganese has been reported from near Panopoy, Cebu.

Tin

Considerable stir was caused some months ago by the reported discovery of tin ore in Mindanao. As such a discovery had long been hoped for, the statement at first gained considerable credence. A brief investigation, however, proved the news to be false. No authenticated discovery of tin has been made in the Philippine Islands.

A California Pipe Line

Special Correspondence

An event of importance to the oil industry of California is the completion of the 8-in. rifled pipe line from Bakersfield, Kern county, to Port Costa on San Francisco bay, a distance of 282 miles, at a cost of $4,500,000. Oil was started in the pipe a short while since and the flow reached Port Costa Sept. 12. The daily flow through the pipe line will be from 17,000 to 20,000 barrels of heavy fuel oil. The rifled pipe line for carrying heavy oil was the invention of John D. Isaacs, formerly of San Francisco, but now consulting engineer for the Harriman railroad lines, at Chicago. This line was constructed under supervision of A. M. Bienenfeld of the Associated Pipe Line Company. Mr. Isaacs in his original experiments, tried several plans of spiralizing the interior of the pipe, but finally settled on the plan of cutting spirally, on the interior of the pipe, corrugations about ⅛ in. deep, these spiral grooves making a complete circuit every 10 ft., so that the water pumped in with the oil, will go to the outside of the interior of the pipe. Into this rifled pipe two separate engines pump nine parts of the heavy oil and one part of water. The water, following the rifled corrugations, forms a thin sheen or lubricant about the oil, and the two move along together, the oil forming a central core that does not come into direct contact with the pipe. This avoids friction, which, with such oil, would prevent progress. Relay pumping stations are established every 23 miles, while with ordinary smooth pipes, they must be maintained every 14 miles, and the oil must be reheated at each place in order that it will flow more readily. The heating is done away with in the Isaacs pipe line.

At each pumping station on this rifle-pipe line there are two 55,000-bbl. oil tanks and one 10,000-bbl. water tank. The flowing oil and its surrounding sheet of water are received into one of the big duplicate tanks and then the water is drained off from the bottom and again taken up by a duplicate water pump and shot into the big pipe into which the oil is being sent from a duplicate oil-pumping engine. Everything is in pairs to avoid delays. This new system of pumping heavy oil is economically a great saving over the heating method; it also effects a great saving over transporting oil by rail in tank cars. The pipe has been buried at a depth of 2 ft., with an undulating up and down grade, every 400 ft., so that the water would drop to the depressions and float the oil without clogging the pipe, if by any accident the pumping should be stopped and the flow checked. The pipe itself was covered with two coats of asphalt granite paint and then wrapped in burlap, and that is treated to a third coat of asphalt paint to protect the metal from moisture and alkali. The Associated Oil Company, which is now shipping by steamer and rail 70,000 barrels of oil daily, expects to get 20,000 barrels a day through the new pipe line. This should prevent further continuance of oil-car shortage. Branch rifled pipe lines are to be built to the Sunset, Coalings and McKittrick oilfields in the San Joaquin valley.

At some mines where buckets are used for hoisting, ore-pockets are cut under the station; the ore is trammed to them in cars and the buckets are filled from chutes as in the case of skips.

Slime Deposition and Agglomeration

In discussing the problem of slime deposition preliminary to cyanidation, H. L. Sulman stated[1] that he is strongly of opinion that a factor of attraction is active between the particles during settlement. A free surface of water possesses physical characters which the interior does not. The free surface shows increased resistance, increased viscosity, increased molecular energy, and even, perhaps, a different chemical constitution. Such properties are summed up in the expression "surface tension."

Solids exhibit some of these properties in a more marked degree; but as phenomena of tension cannot well exist on solid surfaces, the increased molecular attractions resident on a solid surface are usually described as "surface energy."

As between solids and liquids, the phenomenon of "wetting" is to be ascribed to the surface energy of the solid, the liquid being held so tightly by the solid that on withdrawing it the liquid mass is disrupted more easily than the liquid can be dragged from the solid. So also with gases; the surface energy of solids gives rise to the phenomenon of gaseous condensation. These effects are always more intense the greater the surface exposed in relation to the mass. Therefore, the more the surface is increased, the greater is the attraction likely to be exhibited between like particles. Thus the agglomeration of slimes in rivers, if once the particles are deposited within range of their mutual surface attractions, is more to be expected than in the case of larger particles or sands.

This agglomeration, which is accompanied by remarkable dryness of the settled slimes appears to be the central factor in Nichol's continuous slime settler, and also in the Howatson filter and in the Picards settler. The Durant filter, which has lately been introduced in South Africa, utilizes the same factor. The silme, when once agglomerated on the filter surface is sheared off and dropped through the turbid liquid without any tendency to redissemination. Slimes once agglomerated will stand a considerable disturbance without breaking up.

While most people know that Pliny states that the ancients broke ore in mines by pouring vinegar on the heated face of ore, it is less generally known that he further states that they also used bars of iron as battering rams to break the ore from the face. These bars were heavy and several miners were required to each battering ram.

Pulleys from which considerable power is to be taken should always be placed as close as possible to a bearing.

[1] *Bulletin* No. 42, The Institution of Mining and Metallurgy.

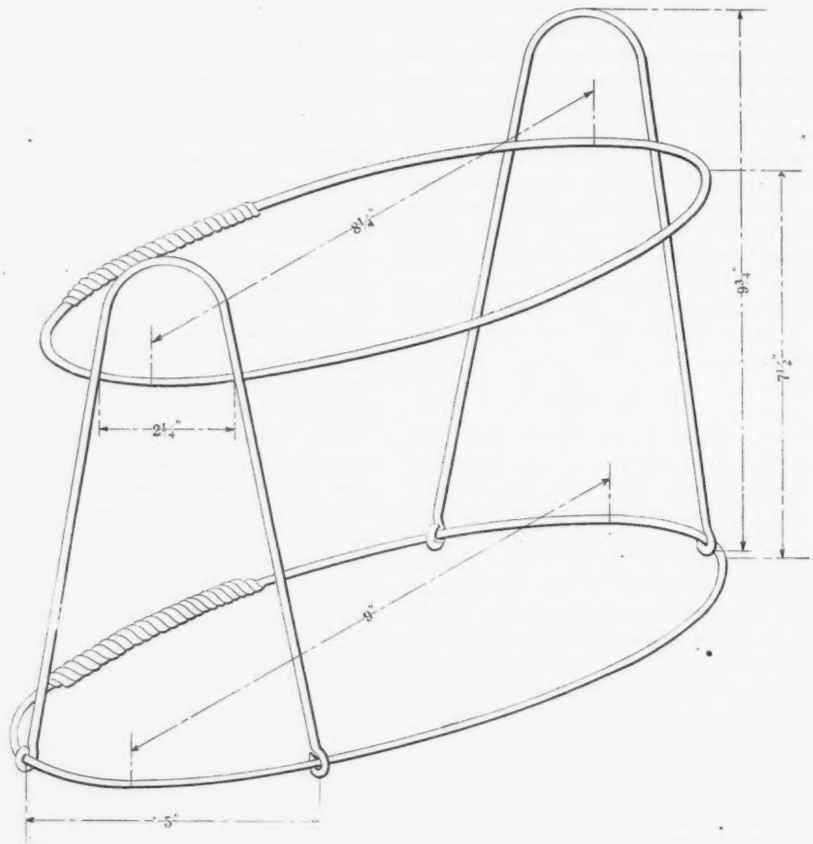
The Anaconda Protective Hood

By Robert N. Bell*

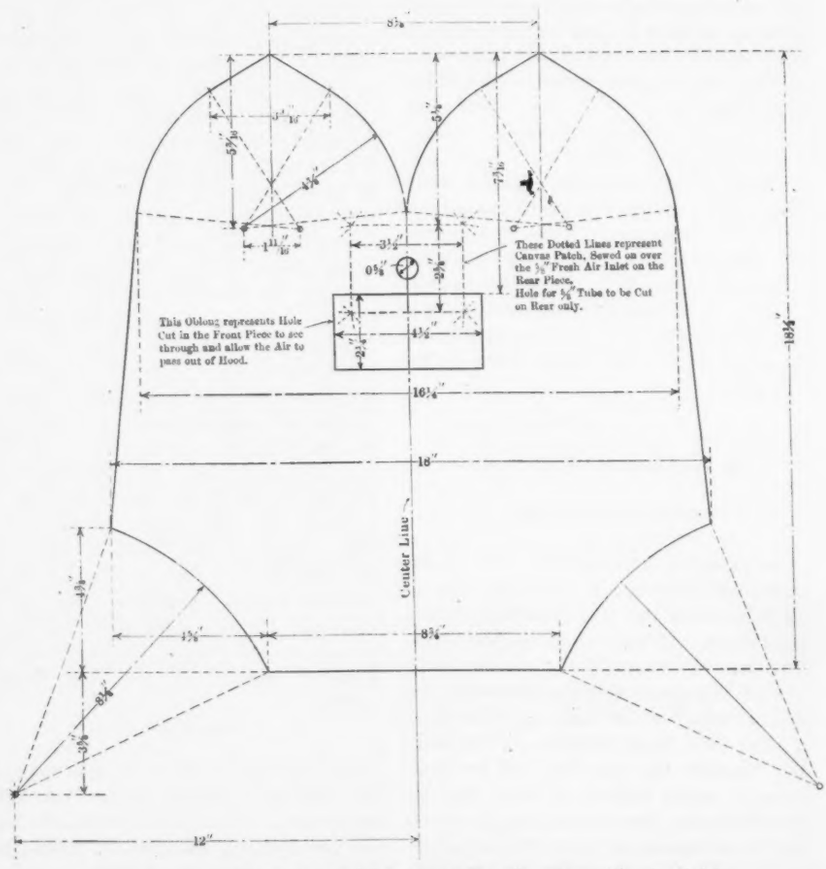
A simple and excellent home-made device for fighting underground fires and poisonous gases, used in the Anaconda mines at Butte, is shown in the accompanying illustrations. It is a simple canvas hood, built on a light wire frame and adjusted for a direct compressed-air line connection with a strong ½-in. hose. It is of such positive action, simple and cheap construction that a big mine can hardly afford to be without it, as its availability may prove priceless in the protection of life and property in the case of underground fires, and other situations that can readily be conceived, where dangerous gases may have to be contended with.

It is made from two pieces of 12-o duck canvas, as shown in the accompanying pattern, without any dressing or preparation, sewn over a frame made of two 12-gage brass wire rings with A-shaped side braces and black tape cap seams. A loose collar band of dressed lambskin, with the short wool left on, is attached to the lower ring, and is adjusted by a rubber tape puckering string around the neck of the wearer. An open rectangular orifice, without any glass or mica protection, 3½x1½ in., after the tape border is sewed in, affords the principal discharge for the compressed air; and permits the wearer to see, hear, talk and breathe in the discharging air with impunity while surrounded by deadly gas, without any serious hindrance or danger from fogging or sweating. He has full freedom of both arms, kept cool by the expanding air, and is not incumbered by heavy metal attachments. At the back of the hood is a nipple nut-and-washer connection covered on the inside by a square patch of canvas 3x3 in., attached only at the corners, allowing the discharging vents direct contact. The nipple forms the male end for the attachments of a short piece of hose, which has a right-angle self-seating coupling, and a male coupling at the other end, with which the main hose and regulating valve attachment from the air line can be conveniently made or unmade by the wearer, or the air can be regulated by the valve or tap at the main air line.

This device was developed by the staff of the Anaconda mine at Butte, Mont., and has been successfully used by them for the past 15 years in building bulkheads, airtight cemented walls, etc., for combating the poisonous sulphur gases that occasionally break into the workings from a burning body of sulphide ore in one of the middle levels of the mine; and more recently for a similar purpose at one of the other big mines of the company, where it has proved the most effective device ever



WIRE FRAME FOR ANACONDA HOOD



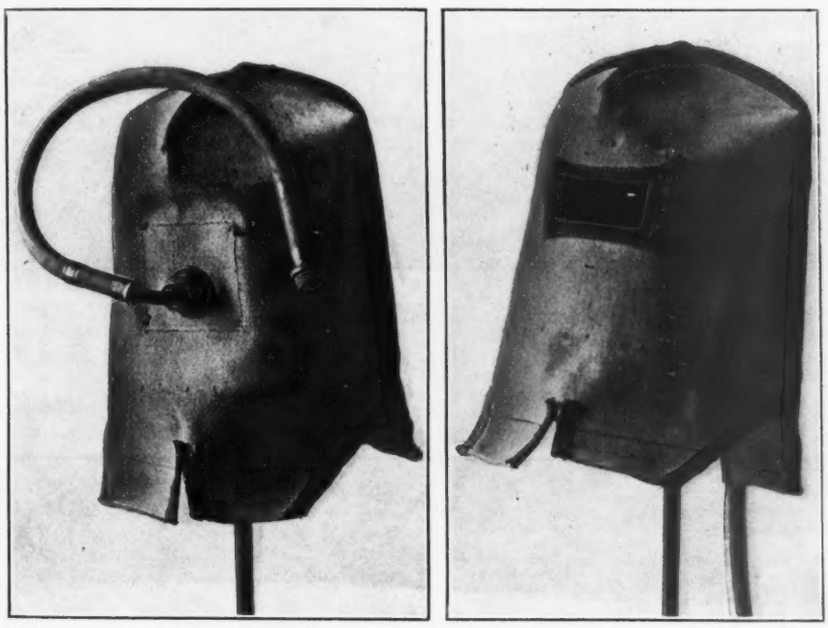
PATTERN FOR COVER, ANACONDA HOOD

*State mine inspector, Boisé, Idaho.

employed for this purpose in that district, and is still regarded as such.

This device is not patented; the idea was first suggested by one of the miners at the Anaconda mine, who had been nearly smothered by one of the heavy fire-fighting hoods formerly employed, in which the peephole fogged so badly as to be practically useless. The miner then suggested breaking the covering out and attaching a direct compressed-air connection. The company puts these hoods up in the rope house in the Anaconda, and generally keeps a dozen on hand all the time.

These hoods weigh complete, with all attachments, including the short piece of hose connection, less than five pounds; and their cost complete is about $7. A first-class ½-in. steam hose is used for the flexible air connection with the main air line in 50-ft. or 100-ft. lengths. The small gage and strong walls of the hose are such as to make it practically safe against kinking.



BACK VIEW FRONT VIEW

THE ANACONDA HOOD

While this hood lacks the mobility of other devices used for this purpose, it is so much lighter, cheaper, and so much more positive, lasting and simple in operation as to be almost invaluable for the purpose for which it is designed.

Of course, it is essential to its employment that the mine in which it is used is equipped with a compressor plant and metal air lines along its main avenues. This is a condition, however, that is now rarely wanting in a modern metal mine where underground fires are likely to occur. In using this device in Butte, two men generally work together, which greatly increases its safety and the facility of changing connections; and it is much more adaptable than would seem at first sight, for with the use of extra hose connections and valves, air or water lines can be laid hundreds of feet with as much safety as with any other device yet invented; while the material for its construction is on hand at any big mine, and its immediate use in an emergency could doubtless often be made the means of preventing disastrous results.

Value of Galena and Blende in Wales

A correspondent in Wales, who operates an important lead and zinc mine, communicates to us the prices received for its sulphide ores as an indication of the rates on these products in Wales. The prices given are for the ores f.o.b. cars, the buyer paying the freight, and paying cash for the ore in six weeks.

Galena—Net lead value, fire asasy, is computed at the average price of foreign lead for three weeks after the sale, plus the full silver value (average of the London price for fine silver for three weeks after the sale). Smelting charge, £3 5s. per ton (2240 lb.). The freight paid by the smelters is approximately 14s. per ton. The smelters state that after the expiration of this contract (in March, 1909), they must have a smelting charge of £3 10s., instead of £3 5s. The ore averages 82 per cent. lead and 10 oz. silver per ton.

Blende—The rate for this ore, delivered at the railway, is as follows, the terms being net cash on settlement of assay. The cost of freight to the smelter is approximately 17s. 6d. per ton.

Spelter, Foreign.	Blende, 50 Per Cent.			Variations. Per Spelter Price.		Variations. Per Unit of Zinc.	
	£	s.	d.	s.	d.	s.	d.
17	3	6	6	5	3	3	0
18	3	11	0	7	3	3	3
19	3	19	0	7	6	3	6
20	4	6	6	7	6	3	9
21	4	14	0	6	9	3	11
22	5	0	9	6	9	4	2
23	5	7	6	7	0	4	5
24	5	14	6	7	6	4	8
25	6	2	0	7	6	4	10
26	6	10	6	8	6	5	2

The scale of prices has been steadily falling during the last few years. Thus, on our contract for 1903-1905, with spelter at £24, the scale price was £6 19s.; while in 1905-1907 it was £6 4s. 6d. We consider the prices paid for English ores absurd, but we fancy that the Swansea smelters have formed a close ring and pool the ores. We are selling to the Continent at prices considerably above those paid by the Swansea buyers. Our blende assays somewhat above 50 per cent. zinc and produces a very good spelter.

Accumulation of Gold on Copper Plates

The amount of gold absorbed and accumulated on battery plates under variable conditions has been investigated by W. F. A. Thomae[1]. Gold is retained on the plates in three ways: (1) In the amalgam which is collected at every clean-up; (2) in a scale of amalgam which adheres to the copper plate and is not removed in the clean-up; (3) In the amalgam which is actually absorbed by the copper plate and is not recoverable until the plate is smelted.

It has been found in practice that the amount of gold actually absorbed by a copper plate, 4 ft. 6 in. wide and 8 to 12 ft. long, is seldom more than 8 to 10 oz.; usually not more than 4 to 5 oz. will affect the first month's crushing returns. This proportion depends upon the rate of absorption which is governed by the temperature, the molecular structure of the copper and other conditions affecting the plates.

The amount of gold retained on a plate in the form of amalgam scale is also a variable factor. It depends largely upon the skill of the millman. The accumulation during the first month's run, when the plates are new, represents only a proportion of the final accumulation.

Mr. Thomae advocates the employment of Muntz metal plates instead of copper. They are cheaper than copper and have the additional advantages of practically absorbing no gold and freely parting with the amalgam scale; consequently the plates are more easily cleaned.

[1] *Bulletin* No. 44, The Institution of Mining and Metallurgy.

DUMPING A TRAIN, SHOWING ROCK PILED UP AGAINST CARS

TRAIN READY TO PULL OUT, SHOWING PLOW ON REAR CAR

Dumping Waste with a Locomotive Train

By Arthur B. Foote*

At the North Star mines, Grass Valley, California, a rather novel method is used in disposing of the waste rock. About 100 tons of waste a day is dumped into the bins at the collar of the shaft by the self-dumping skips. Formerly this was trammed by hand in one-ton cars and side-dumped from a track laid along the edge of the dump, the track being shifted over sideways whenever necessary to allow the cars to empty freely.

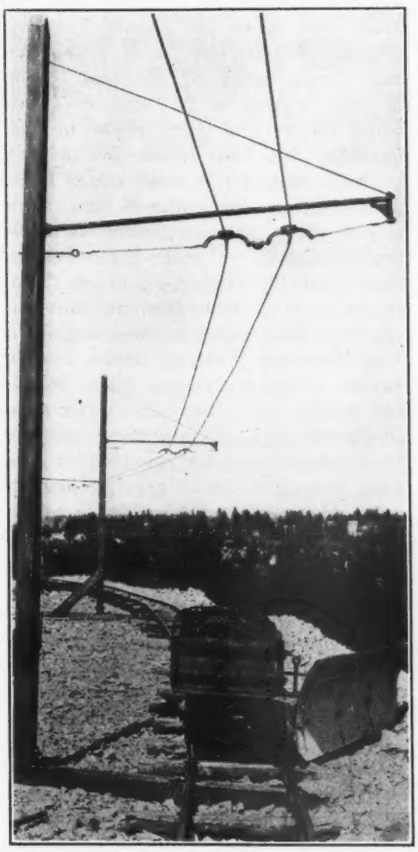
A 5½-ton electric locomotive hauling a train of 15 three-ton side-dumping cars was installed to transport the ore to the mills, and it was naturally desired to use this means of handling the waste also. But it was found that if the track was laid close enough to the edge of the dump to allow the cars to dump over the edge the track would slide off under the weight of the train and locomotive. To build a trestle was too costly. So it was decided to construct a plow that could be coupled to the end of the train and which would push over the edge the rock that piles up along the track by the side of the cars. This plan has proved entirely successful, eliminating the danger of losing the locomotive over the dump, and doing away with the necessity of shifting the track at frequent intervals.

As the track is laid a safe distance, about 18 in. from the edge, the rock remains piled up against the cars, after they are tipped. But the rock does not prevent the empty train from being hauled away by the locomotive. As the train is hauled out, the plow attached at the end pushes the piled-up rock over the edge. The track does not need to be moved again until it is about 4 ft. from the edge.

The plowshare is 2 ft. high by 8 ft. long, constructed by bolting pieces of ½-in. steel plate to a 6x8-in. timber. The plates were cut from an old winding drum, giving the outside of the plowshare a concave surface. This is pivoted at its center to an arm extending from the middle of a four-wheeled, wooden truck loaded with iron. Either end of the plowshare can be swung in close to the truck and pinned there so that the plow will work in either direction. The bottom of the plowshare scrapes the ties. The outer end is 3 ft. 6 in. from the rail, and the inner end is pinned as close to the rail as possible. It is simply a road scraper mounted on car wheels with the scraper all on one side.

The trolley poles, spaced about 30 ft. apart, instead of being set in the ground, are bolted by means of short pieces of angle iron to long ties laid under the rails, and braced to the ties with 2x6-in. diagonals. Both ties and poles are 4x6-in., and the rails are fastened by lag screws to the ties, large washers being used. In order to strain the poles as little as possible, the trolley wires are allowed to be quite slack. The last pole is guyed to the track ahead to keep the poles from falling in a direction parallel to the rails.

The end of the track connected to the switch on the main line is, of course, fixed,



METHOD OF FASTENING POLES TO TRACK; CAR WITH PLOW

and the outer end is swung fanwise with the switch as a center. A short trestle is necessary to support the outer end of the track, otherwise the dump would become continually shorter, as the plow is necessarily backed past the point where the last car dumps. The accompanying photographs will perhaps explain the method of operation and construction more clearly than words can.

*Assistant superintendent, the North Star Mines Company, Grass Valley, Cal.

The 60 new stamps for the New Modderfontein mill on the Rand will weigh 1650 lb. each. Forty of these stamps will be arranged in sets of five to a cam-shaft, while the other 20 stamps will be arranged as usual in sets of ten. The pulp from the stamps will go to three tube mills.

During the year ending May 31, 1908, the Alaska Treadwell 240-stamp mill consumed 53,188 oz. quicksilver, while stamping 377,271 tons of ore. Of this amount the batteries used 46,099 oz., the plates 6367 oz. and the vanners 722 ounces.

The Geology of Cobalt

Special Correspondence

A report just issued by the Bureau of Mines of Ontario[1] brings as nearly as possible up to date the account of the researches made into the geology of the Cobalt district, and of the Montreal river and Temiskaming areas. It is mainly the work of Professor Willet G. Miller, geologist of the Province and the first explorer of Cobalt.

Geology of the Cobalt Area

In the preface to this publication, the first edition of which appeared in 1905, the author states that it has not been found necessary to make any fundamental changes in the description of the geology or the ore deposits, his views concerning the relationship of the rocks, the character of the veins and the economic problems presented by the camp remaining practically the same. Much work has been done in the interval, but no new type of orebody has been discovered, with the possible exception of the ore associated with the aplite of the Montreal river area. While both the silver-cobalt ores associated with the aplite of the Montreal river area and those in the veins of the Cobalt area proper are believed to have been derived from the diabase magma, the aplite ores appear to have come more directly from the magma and can be classed as of aqueo-igneous origin, the ores of the Cobalt area proper being of aqueous origin. When the earlier editions appeared it could not be definitely decided what was the source of the silver in the veins, the occurrence of cobalt in association with the diabase which is characteristic of the Cobalt area proper, being considered sufficient evidence to show that the cobalt-nickel arsenides originated in the diabase magma. In the Wendigo lake area 30 miles north of Cobalt, cobalt-nickel arsenides were found in the diabase, but not in the accompanying Huronian fragmental rocks, a similar condition prevailing in surrounding areas, silver being absent. As all the rock systems characteristic of Cobalt were not present in these outlying areas it was felt that the evidence as to the source and origin of silver was not conclusive. Since then, however, the discovery of widely distributed veins in the diabase of the Montreal river and Temagami forest reserve areas is regarded by the writer as conclusive proof that the diabase magma is the source of the silver as well as of the cobalt-nickel minerals.

The Provincial Mine

Among the additions to the volume is

[1]"The Cobalt-Nickel Arsenides and Silver Deposits of Temiskaming." Third edition. By Willet G. Miller, Provincial geologist of Ontario. Part II, report of the Bureau of Mines, 1907. Pp. 212, illustrated; 9½x6½ in. Toronto, 1908; King's Printer.

a description by E. T. Corkill, inspector of mines, of the Cobalt mines which were in operation during the first half of 1908, fully illustrated with photographs showing the plants and mine buildings. Concerning most of these later details have been published, or are elsewhere obtainable, but the report contains some information not previously given out regarding the Provincial mine on the Gillies timber limit operated by the Government. The shaft is down 140 ft., with levels at 65 and 125 ft. At the first level 450 ft. of drifting and 70 ft. of crosscutting have been done, and a raise has been put through to the surface 50 ft. east of the shaft on the vein, timbers put in, and stoping begun for 90 ft. along the vein. On the second level 125 ft. of drifting and crosscutting have been done, and a raise to the first level begun. The machinery installed consists of a 100-h.p. return tubular Jenckes boiler, the high-pressure half of a Rand air-compressor, developing 500 cu.ft. of free air per minute, and a 7x10-in. Jenckes hoist. In the mine a Worthington pump has been placed on the first level, and a Cameron sinking pump on the second level. Three air drills are kept in steady operation and a force of 25 men are at work. The report is reticent as to the output, the value of the ore, and the result of underground development in discovering additional veins; in fact no information is furnished tending to throw any light upon the value of the property. Two shipments were made during the earlier part of the year, amounting to 75 tons.

Montreal River and the Temagami Reserve

The third chapter is devoted to a description of a number of areas surrounding Cobalt in which silver or cobalt discoveries have been made. Cyril W. Knight, assistant geologist, reports upon the Montreal River and Temagami Forest Reserve area. This region, as shown on the map accompanying the report, includes an area of 1080 sq.m., of which something less than one-third has been geologically mapped. The Montreal river flows southeasterly through this territory, dividing it roughly into halves, the southwest portion being part of the Temagami Forest Reserve. Much of the surface of the country is similar to that of Cobalt, the Montreal river area presenting the same kind and succession of rocks. In addition to the Keewatin, Laurentian and conglomerate series of the Huronian, there are considerable areas of the quartzite-arkose series, but no contact was found between these quartzites and the lower Huronian conglomerates, so that the relation to the latter is not clear. The diabase and gabbro in which the cobalt-silver veins occur are the youngest series in the field, as where they occur in contact with the other rocks they are seen to penetrate them. Like similar rocks at Cobalt, they appear to be in the form of sheets or sills, no evidence of surface flows being observed. The diabase of the Montreal river presents somewhat greater variety than that of the Cobalt silver area. It is usually medium in grain, varying from fine-grained types to those in which some of the pyroxene individuals are an inch in length. In some cases it shows very marked magmatic differentiation and may pass into more acid types like syenite, or even granite. Boulder clay, sands, gravels and clays cover much of the area. What is very striking is the wide area over which the mineral cobalt bloom in small quantities has been found—the majority of cases occurring in small cracks in the diabase series. The center of James township is about 37 miles northwest of the town of Cobalt. At many places between these points bloom has been found. Small cracks, some of them containing native silver, have been found in the townships of Van Nostrand, Whitson, Banks, Speight, Barber, Tudhope, James, Farr, Mickle, and Smyth, and some miles farther north at Bloom Lake, in unsurveyed territory. Many of these small veins differ in character from the Cobalt type. They are aplite dikes—sometimes spoken of as diabase pegmatites, having the composition of a granite, but finer in grain and containing few colored constituents, like mica or hornblende. These aplite dikes are supposed to have been formed by cracks appearing in the diabase as it cooled and contracted. They were subsequently filled with vein or dike matter, which probably came from hot solutions given off by parts of the diabase still molten. Small scales of native silver frequently occur in the aplites. Some of the veins contain barite, which is not known at Cobalt. Among the more promising of the mining claims inspected by the writer were the Shane-Darragh, southeast of Silver Lake, Mickle township, where the vein had a width of from 2½ to 7 in., containing native silver, and the Moose Horn mines, James township, where there are six veins carrying native silver, one of them showing silver content equal to the rich ores of Cobalt.

Other Areas

Other areas dealt with are Bloom Lake, some 6½ miles west of Farr township, by W. R. Rogers; Casey and Harrison townships, by R. E. Hore; south of lake Wendigo, by R. E. Hore, and the territory west of Ray lake, on the Montreal river, by J. S. DeLury; but their observations, while of scientific interest, are not of sufficiently recent date to include later discoveries and developments. A. G. Burrows, who was sent into the area south of Lorrain township this summer, contributes some notes on its geological formation which he states is similar to that of Cobalt. The Keewatin rocks vary considerably in appearance. About a mile southeast of Loon lake they are seen in well defined bands with a schistose structure in part and almost vertical dip. Some of the rock has a cherty appearance and some resembles ordinary green schist, in which the characteristic torsion cracks filled with calcite or quartz are developed. The Keewatin belt in the vicinity of Keeley's has a harder, more compact appearance, and breaks with a rounded fracture, and to the eye has a slate-like structure. In the western portion of this area, there is much old diabase, some of which retains the diabase structure, while much of it is apparently altered to amphibolite. This area contains most of the promising veins along the eastern border, and near the contact with the Post-middle Huronian diabase. The western portion of the area is chiefly reddish quartzite. The Huronian formations are comparatively flat and show little evidence of disturbance. The diabase and gabbro rocks may be seen in contact both with the Keewatin and Huronian, and cutting the latter at an inclined angle and overlying it. Most of the promising veins have been found in the Keewatin, but good silver values have been obtained in the diabase on several claims.

The Broken Hill South Silver Mining Company

This company owns an important silver-lead-zinc mine in the Broken Hill district in New South Wales. The report covers the half-year ended June 30, 1908. The receipts from the mine in that period were £112,094; expenses, £91,442; net balance, £20,652. Income account shows a balance from previous half-year of £89,256, making a total of £109,908. Against this were charged taxes, royalty, London office expenses, etc., £5154; new construction, £491; dividends paid, £20,000; total, £25,645, leaving a balance of £84,263 to current year.

Ore raised in the half-year was 79,446 tons. Development work amounted to 1101 ft., and the estimated ore reserve is now 1,350,000 tons. There were 55,748 tons of waste used in filling old stopes. The average number of employees was 968, of whom 545 were employed underground and 423 on surface.

The crude ore treated was 78,803 tons, the contents by assay being 442,854 oz. silver, 12,446 tons lead and 9720 tons zinc. The concentrates produced were 12,613 tons, carrying 235,055 oz. silver, 9149 tons lead, and 651 tons zinc; the recoveries being 53.1, 73.5, and 6.7 per cent., respectively. Other products reported were:

	Tons.	Assay Contents. Silver, Oz.	Lead, Tons.	Zinc, Tons.
Tailings, zinc.....	11,259	41,374	562	2,068
Tailings, quartz...	47,533	126,953	1,852	6,074
Slimes.....	7,398	39,472	883	927
Total.....	66,190	207,799	3,297	9,069

The costs reported, reduced to dollars, were: Mining, $2.994; filling old stopes, $0.548; development, $0.276; milling, $1.272; total, $5.09 per ton of ore. The cost, based on final product, was $31.812 per ton of concentrates.

The directors' report says: "During the six months one dividend was paid, absorbing £20,000; £30,000 has been spent in plant and machinery; the Zinc Corporation's deposit of £10,000 and interest has been taken into revenue; and since the closing of the accounts another payment of £10,000 has been received from the same source. The average price of lead per ton for the half-year has been £13 14s. 10d., as compared with £18 6s. 5d.; and of silver, 2s. 3¼d., against 2s. 7⅝d. per oz. of the previous period.

"The amount of development done in the mine during the half-year has been small, and has been confined largely to necessary work, in view of the fact that such large reserves of ore were blocked out when the finances of the company were in a flourishing condition.

"The new mill is now practically completed. It is divided into four sections, two of which have been set to work, and are able to produce all concentrates sold for delivery at present; the remaining two sections are being connected up and adjusted. The manager is more than satisfied with the results obtained, and its capacity largely exceeds what was expected of it.

"Since the last report, further sales of concentrates have been made for delivery during the last four months of this year, and also a large parcel for delivery all next year, on terms about equal to the previous contracts. Recently, further inquiries have been received, but the directors have thought it wise to be content with the sales made, rather than extract further large quantities of ore from the mine to be disposed of at current metal prices, which leave only a narrow margin of profit.

"Recently the original agreement with the Zinc Corporation has been determined, and a new arrangement has been entered into; this provides that all tailings produced by the old mill, and estimated at 1,100,000 tons, are sold at a flat rate of 3s. 10d. per ton. Current production tailings remain the property of this company. A further cash payment of £10,000 has been received, making £49,500 in all, no more payments being due until July, 1909. The new mill is now producing a high-grade tailing, which is being stacked on the surface, and a low-grade product, which is being conveyed underground for filling the mine.

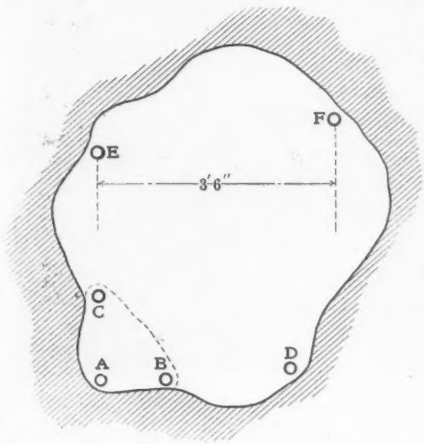
"The item of costs has received careful attention. The rapid increase in the cost of all important materials used by the company, together with increased rates of wages and higher smelting charges, has caused grave concern, coming as they have at a time when low metal prices have had to be faced, and following a period of unusual prosperity.

"No satisfactory advance has been made toward procuring a second and adequate supply of water for Broken Hill. Unfortunately, the government of New South Wales has refused to assist the Umberumberka Water Trust with a loan to enable it to carry out its proposed scheme. The manager estimates that unless heavy rains fall by November, the water now conserved at the Stephen's Creek reservoir will be about exhausted. It is evident, therefore, that Broken Hill is in a very precarious position, and may have to face another water famine before the end of the year."

Sinking a Winze with Long Holes

By George C. McFarlane*

Last spring I had occasion to sink a winze in a hurry so as to make an air connection with a railroad tunnel. I had driven this tunnel from the east side of the ridge and was within about a hundred



CROSS SECTION OF THE WINZE, SHOWING ARRANGEMENTS OF THE HOLE

feet of coming out into the long approach on the west side when warmer weather made the natural air circulation too sluggish to carry out the powder smoke. I had already sunk several feet with hand steel, when I decided to continue the work with long holes.

The material to be sunk through was a rather hard red granite. I used a donkey boiler to furnish steam to drill the first hole, and when this hole broke through into the heading of the tunnel I ran a hose down the hole and connected with the pipe-line in the tunnel. Five more holes were now drilled, arranged as shown in the accompanying sketch. All the holes were about 30 ft. deep; they were started with a 2¾-in. and finished with a 1¼-in. bit. It took 4½ shifts to drill the six holes with a 3¼-in. Rand drill.

The holes were finished at midnight Saturday and three men began the blasting at 3 a.m. Sunday. Starting at the bottom, they continued to blast holes *A*, *B* and *C*. By noon they had a small hole through to the surface, and the winze was blasted to its full size by 4 a.m. Sunday.

The method of blasting was as follows: One of the men in the tunnel heading held a rag in the bottom of hole *A* with a tamping stick, while the men on top rammed in a foot of clay. One foot of dynamite was then tamped down; no tamping was placed on top and the charge was detonated with a drop fuse. This procedure was continued with the three holes in rotation. Every blast broke from 6 to 12 in. of ground. After the first couple of rounds it was not necessary to plug the bottom of the holes, because when one hole was blasted it would close up the bottoms of the two adjacent holes.

When the blasting of the three holes was completed, an irregular, three-cornered hole was made about a foot in diameter and reaching from the tunnel to the surface. Holes *D* and *E* were then blasted alternately, about 6 ft. of the hole being loaded for a shot. Finally hole *F* was loaded from top to bottom and fired. This completed the winze.

The total time required was six shifts for the 30 ft. or 5 ft. per shift. The cost was as follows:

Drilling—1 machineman 4½ days at $4, $18; 1 machine helper 4½ days at $2.50, $11.25; 1 nipper 4½ days at $2, $9; steel sharpening, power, etc., $13.50. Blasting—1 foreman 1½ days at $4, $6; 2 helpers, 1½ days at $2, $6; 5 boxes, 60-per cent. dynamite, $45; box of caps and 100 ft. fuse, $2; total, $110.75.

This makes the total cost of sinking the 30 ft. $110.75, or $3.70 per foot. No particular pains were taken to plumb the drill in starting the holes and they did not vary over 5 in. from being parallel throughout. It takes three times the quantity of powder to break the ground with this long-hole method, but in this instance it was three times as cheap as hand sinking for the part of the winze sunk by hand cost more than $9 per foot for labor and powder.

*Mining engineer, 312 Bearinger building, Saginaw, Mich.

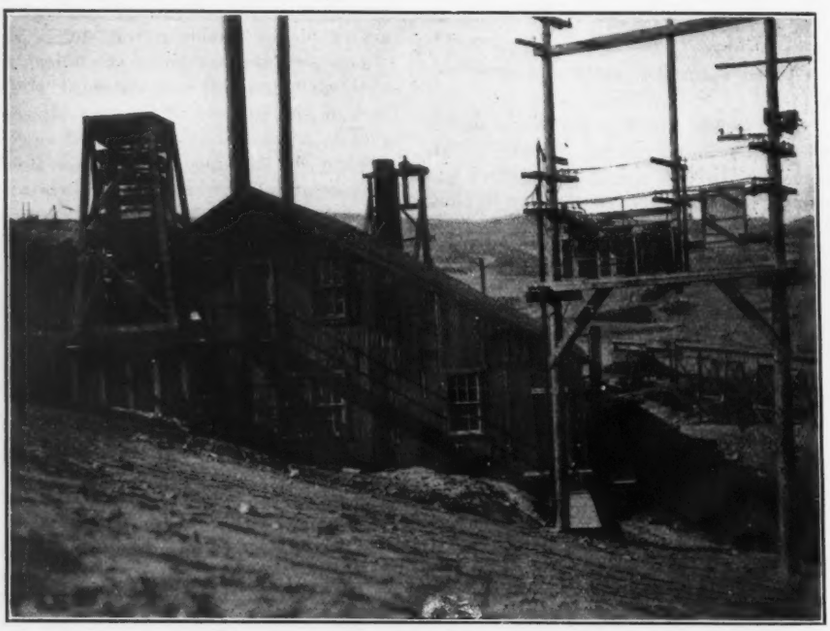
By installing a fuel-oil system at the Alaska Treadwell mine, the cost for steam power was reduced by more than $50,000 in a year. The cost, using coal, was $125,021, from Oct. 15, 1906 to May 15, 1907, while from Oct. 15, 1907, to May 15, 1908, the cost, using oil was $74,262. The total cost of the installation has been $28,680 to date.

During 1907 the output of oil residue in California increased by over 50 per cent.

Electrical Equipment of the Butte-Balaklava Mine

By A. Floyd Bushnell.*

The Butte-Balaklava mine, situated in a northeasterly direction from Anaconda hill, and which is electrically equipped throughout, is making a record both for rapid development work and inexpensive operation. In August, 1907, this company began using a steam hoist to sink the shaft to a depth of 500 ft. Early in February of this year an electric hoist and compressor were installed, and with this new and up-to-date equipment the shaft was sunk from the 500-ft. level to a depth of 716 ft. in two months.



HOIST HOUSE, BUTTE-BALAKLAVA MINE. COOLING TOWER ON THE LEFT

The expense in operating and the initial cost of the electrical equipment, as the electric power is purchased and not generated at the mine, are considerably less than when steam is used for power, while the ease and quickness with which the machinery of the entire plant may be started and stopped is a second, and important, consideration. Since the installation of the electrical equipment, the only steam used at this plant is for heating during the colder months of the year.

According to C. N. Newton, superintendent of the property, the expense of installing the electrical plant is half what it would have been in the case of a steam plant. The Butte-Balaklava company saves approximately $400 a month by the use of electricity, and if it were necessary to pump much water a greater amount would be saved; much less oil is used and the need of a fireman is done away with. The cost of maintenance of this electrical plant is 40 per cent. less than that of a steam plant of the same capacity. City water at a considerable expense was formerly employed to cool the air cylinders of the compressors, but recently the company has erected a tower for cooling the water used. The water is pumped to the top of the tower, and cools sufficiently as it filters through the screens to be used again. By using this device the cost of cooling the cylinders has been decreased somewhat.

The electrical equipment has so far proved entirely successful, and unless something unexpected happens its use will be continued. Since the electrical machinery has been installed there has been only one shut-down on account of accident. Power for operating the plant is furnished by the Madison River Power Company and is transmitted a distance of 50 miles.

The hoist has a double drum and was manufactured by the Denver Engineering Works; each drum has a hoisting capacity of 5000 to 6000 lb. A 125-h.p. General Electric Company motor is used to drive the drum. This hoist has sufficient capacity for sinking the shaft to a depth of 1000 or even 1500 ft., but as soon as the 1000-ft. level is reached a larger hoist of the same make will be installed. The rope speed averages 700 ft. per min., which is a good speed for an electric hoist, but as high as 800 ft. per min. can be developed in case of necessity.

The mine is at present equipped with an Ingersoll-Rand compressor, with a capacity at this altitude of 606 cu.ft. per min., driven by a 100-h.p. General Electric Company motor, but the company intends to install a second electric-driven compressor having a capacity double that of the one now in use. The compressor furnishes air for the pumps and drills; compressed air also is used to blow out the smoke after blasting.

The carpenter shop is completely equipped with electrical machinery for sawing and framing timbers. An electric pump has been ordered; this is to be placed as soon as needed in the station on the 700-ft. level. The water is now being raised by sinking pumps to the 500-ft. level and from there to the surface by the station pumps.

Ore is being blocked out on the 500-ft. level, and hoisting will be started as soon as the veins on the 700-ft. level are developed sufficiently. On the 500-ft. level considerable development work has been done on the Edith May vein, and two feet of high-grade copper ore carrying considerable silver has been found.

On the 700-ft. level, stations are being cut both on the north and south sides of the shaft. Crosscuts both north and south are to be started in a short time, and it is expected that the Edith May vein will be intersected also on the 700-ft. level. The crosscuts on the 700-ft. level will also intersect three other known veins, the Bell-Speculator, Old Joe and Sioux Chief, which have been explored on the 50-ft. level.

A new head-frame is to be erected, the timbers having already been ordered. The temporary ore bins on the Butte, Anaconda & Pacific tracks will soon be replaced by permanent structures.

*Box 751, Butte, Montana.

Commerce between the United States and Germany

The total imports from Germany in the fiscal year ended June 30, 1908, were valued at $142,935,547 against $161,543,556 in the previous 12 months. The exports during these periods were valued at $276,910,223 and $256,595,663 respectively.

The trade in articles more nearly related to the mining and metallurgical industries is given in the accompanying table:

TRADE OF THE UNITED STATES WITH GERMANY.

	1907	1908
Imports:		
Cement, lb.	413,909,830	218,794,
Copper, lb.	6,636,210	4,417,
Earthenware, dollars	5,153,943	5,287,2?7
Pig iron, tons	32,504	2,096
Exports:		
Coal, bituminous, tons	5,053	8,957
Copper ore, matte, etc., tons	212	35
Copper, lb.	91,016,167	134,987,671
Fertilizers, tons	261,163	349,150
Oil, illuminating, gal.	120,183,398	151,802,286
Oil, lubricating, gal.	19,591,795	22,158,084
Paraffin, lb.	11,898,234	7,457,896

There was also exported in 1908 machinery to the value of $5,726,637 against $6,208,859 in 1907.

Underground Conveyers at the Kleinfontein Mine

By Edward J. Way*

The great bulk of the unskilled colored labor employed underground on the Rand may be divided into three sections: Hand drilling; shoveling the ore down the stopes; and tramming. The system of mining makes it economically impossible to substitute mechanical traction for the method of hand tramming at present in use, while the complete replacement of hand drilling by power drills is not at present feasible. The possibilities of any reduction in the number of unskilled colored laborers employed underground are, therefore, limited for the present to the installation, in place of the existing method of shoveling and scraping the ore down the stope, of some conveyer system for handling the broken rock in those stopes where the dip of the reef is not sufficiently deep to cause it to roll down from the working faces to the stope boxes, in readiness for loading into the underground trucks for conveyance to the shafts; and to the employment of an efficient stoping drill which would drill the equivalent of five to seven hand-holes per day.

As the backs are 200 ft. long, many of the working faces of the stopes are over 200 ft. in length, and it will be readily understood that, under the method of hand shoveling at present in use on the greater number of the mines, a large amount of unskilled colored labor is required to shift the broken rock down the stopes the majority of which are inclined about 26 deg. to the horizontal. Any conveyer system which could economically do this work would result in a large reduction in the number of unskilled colored laborers required.

The chief difficulty which had to be faced in the installation of such a system was the fact that the working faces of the stopes were constantly shifting, and so whatever type of conveyer it was decided to employ it would have been necessary to take it down and re-erect it at each blast. The method of operating the conveyer was a further difficulty, as any system requiring a power drive was impossible, both from the point of view of capital expenditure and running costs, and on account of the mechanical difficulties due to the conditions under which the conveyers would have had to work in the stopes.

Construction of the Swinging Conveyers

These difficulties have, however, been overcome by the adoption of swinging conveyers hung from the hanging wall of the stope by chains, and operated, according to the length of the conveyer, by one or more men pulling on their upper ends. The conveyers are 18 in. wide and vary in length, according to the state of development of the stopes, from a maximum of 224 ft. to a minimum of 32 ft. In order to permit easy handling they are built up in 8-ft. lengths of ⅛-in. iron plates slightly troughed.

The bottom end of each length is designed to fit into the top end of the length below it, and is secured to it by means of two eye-bolts, one on each side. Square heads forged on the shanks of these eye-bolts are passed through square holes in the overlapping sides of the adjoining lengths of the conveyer, and the shanks are then slipped upward into slots which just fit them; the adjacent lengths are thus secured together while at the same time a little play is allowed between them and a certain amount of flexibility is given to the whole conveyer. The conveyer is suspended close to the working face of the stope by means of short lengths of chain hooked into the eye-bolts, the two chains from each pair of eye-bolts being secured to a single chain hung from a hook-bolt wedged into a hole drilled in the hanging wall of the stope.

This method of construction was found to permit of very rapid handling, it being possible to take down and re-erect a conveyer 224 ft. long in about 45 min.; while each time a conveyer is shifted, owing to the advancement of the working face, it is only necessary to drill one more hole in the hanging wall than there are 8-ft. lengths in the conveyer, that is, for a conveyer 224 ft. long only 29 holes are required.

The conveyer is hung as close as possible to the working face for convenience of shoveling, and is taken down and put up again at each blast. When the working face has advanced about 6 ft. a fresh series of holes is drilled in the hanging wall, and the conveyer is again brought close up to the face of the stope. The conveyers are operated, according to their length, by one or more men pulling on ropes attached to the upper end of the conveyer. The men pull up the conveyer and then let it swing back by gravity, the jerks thus transmitted to the ore causing it to slide down the conveyer and to be discharged at its lower end.

The reduction in the amount of unskilled colored labor employed in the different stopes depends, of course, upon the length of conveyer required, varying from about 22 men on a conveyer 224 ft. long to three men on one 32 ft. long.

The number of conveyers in use at the present time is 55, and 15 more are being made to complete the equipment of the mine, so that the total number ultimately in use will be 70. As the average saving in labor works out at about six men per conveyer, the total reduction in the number of unskilled colored laborers engaged in shoveling the ore down the stopes, resulting from the installation of the system of stope conveyers, will be about 420 men.

Proposed Mono-rail System

In order to reduce still further the number of unskilled colored laborers employed underground, I have under consideration at the present time a scheme which includes the lengthening of the backs from 200 to 400 ft. and their equipment with stope conveyers of a maximum length of 448 ft., and the installation of the mono-rail system of tramming in place of the ordinary tramway system at present in use underground. This system, suggested by the success of the mono-rail in connection with electric telpherage, consists, as the name implies, of a single rail suspended in the drive, crosscut or winze by means of iron hangers firmly secured in holes drilled in the roof.

Switches, turntables, crossings, etc., are easily adapted to the single rail. A switch, for example, consists simply of a short length of rail pivoted vertically at one end on the last hanger before the branch, and having the other end supported by a hanger sliding in a slot, curved to the arc of a circle having the pivot of the switch rail as center and the rail itself as radius, cast in an iron plate secured horizontally to the roof of the drive. This permits just enough travel to allow the free end of the switch rail to swing from one branch to another, where it is secured by a sliding fish-plate.

The truck, consisting of the usual U- or V-shaped body, is attached by a pin at each end to a bridle hung by means of two T-shaped drawbars to a pair of two-wheeled trucks running on the suspended rail. The short equal arms of the T-drawbars have fixed axles on which the truck wheels run loose, while the long arm of the T is fitted with a swivel clip connecting it to the bridle. The weight of the car and of its contents and of the bridle is thus transmitted to the trucks through the swivel clips of the drawbars, and each truck is, therefore, free to move independently of the other on a vertical axis. Since the wheel-base of each truck is as short as possible, and the trucks themselves are set as close together as clearness will allow, the cars can negotiate with the greatest ease the very sharp curves on underground tramways.

The main advantage of the mono-rail over the ordinary system of hand tramming along a two-rail track laid on the floor of the levels is that both rail and axle friction are reduced to a minimum, owing to the suspended rail and the cars being above the mouths of the ore-chutes, and, therefore, out of the way of the dust and rock which, in the ordinary system of hand tramming, is inevitably spilled on the wheels and the track rails while the cars are being filled at the chutes; and also out of the way of the acid water,

*Consulting engineer, Hotel Savoy, London, England.

Note—Abstract from an article, entitled "Labor-saving Appliances at the Mines of the New Kleinfontein Company, Transvaal," read before the Institution of Mechanical Engineers, Nov. 15, 1907.

mud, etc., which is nearly always present on underground tracks.

The capacity of the cars ordinarily in use underground is 12 cu.ft., holding ½ ton each. Owing to the bad working conditions, the number of men required to handle each car is usually two, thus necessitating the employment of a large number of unskilled colored laborers in tramming the ore from the stope boxes to the shafts. This number I expect to reduce greatly by the installation of a carefully graded mono-rail system, and also by the introduction of an improved car of 2-tons capacity, fitted with frictionless axle-boxes. This car will be easily handled by one man.

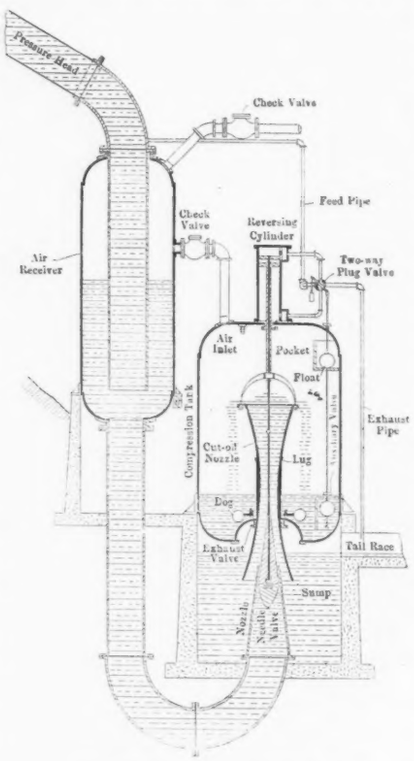
By the adoption of this scheme I hope to bring down the number of unskilled colored laborers employed in the actual handling of rock underground to what is practically an irreducible minimum. The only means by which the number could be further lowered, namely, an electric or compressed-air railway system or other mechanical haulage system, while perfectly feasible in a coal mine or other mining operation where the work is all carried out on one plane, is practically impossible under the conditions prevailing in the mines of the Witwatersrand, and in fact in metalliferous mining generally.

McFarlane Hydraulic Air Compressor

A hydraulic air compressor of the direct-acting, pulsating type, recently patented by Geo. C. McFarlane, effects an economy of water and energy by adapting the pressure of the water to that of the air to be compressed. To compress air to 85 lb. pressure requires a 200-ft. gravity head of water. If this head were turned directly into a tank full of air, it would compress the air to 85 lb. pressure and force it out of the tank at that pressure; however, an enormous loss of energy would take place in the initial stages of compression. To compress the air without loss of energy requires that the water pressure entering the tank should be only slightly greater than the pressure of the air at any given stage, i.e., starting at a couple of pounds pressure, gradually increasing to 16 lb. when the tank is half full, 46 lb. when the tank is three-quarters full, increasing thence to the final pressure, 85 lb. when the tank is 85 per cent. full, then using the full water pressure to fill the remaining 15 per cent. of the tank, thereby expelling the compressed air into the receiver. In the McFarlane system this pressure regulation is accomplished by intermingling various percentages of dead water with the inrushing jet of live water.

A nozzle, or monitor, connected with a head of water, produced either by gravity or a turbine pump, is mounted under an air tank. By an arrangement of a shifting cut-off nozzle and a needle valve, the stream issuing from the monitor sluices in enough dead water from the sump to reduce the velocity head of the stream entering the tank to the air pressure it must overcome. In the initial stages a small opening of the nozzle sluices in a big stream of dead water from the sump, in the final stage the needle valve gives a full opening of the nozzle, while the cut-off valve shuts off all or nearly all the dead water.

The accompanying illustration shows the operation of the system; the pipe head passes down through and nearly to the bottom of the air receiver; from the receiver the water is conducted down a pipe,



MCFARLANE AIR COMPRESSOR

through a return bend up into the nozzle, whence it is periodically admitted into the compression chamber. The nozzle is opened and closed by a needle valve, and a vertically moving cut-off nozzle regulates the amount of dead water admitted with the live head. The needle valve and the cut-off are moved up and down by separate pistons operating in one reversing cylinder, their movements being controlled by floats, which operate a two-way-plug controlling valve, to admit water above or below these pistons. An exhaust valve for quickly emptying the tank is raised by the upward movement of the cut-off nozzle, the receding water level releases the float-operated dogs and permits the exhaust valve to drop back into place when the tank is nearly empty. The floats which move the controlling valve work in pockets and give a quick reverse to the valve.

The Cycle of Operation

Starting with a tank full of air, the bottom float being down, the controlling valve directs the feed water into the upper port of the reversing cylinder; this shoves both pistons down, lowering the needle valve and cut-off nozzle. As the water flows into the tank compressing the air, the rising water level raises an auxiliary valve against the drain holes in the upper pocket, and no water can enter the upper pocket until the water level reaches the top of the pocket, when it overflows and quickly throws up the float, reversing the controlling valve, which now directs the feed water into the lower port of the reversing cylinder. Now since the lower piston head rests tightly against the lower cylinder head, the force of the water is expended in raising the upper piston, which closes the needle valve; near the end of this up-stroke, a dog nut on the needle-valve stem engages the bottom of the hollow rod of the lower piston, raising it enough to clear the lower cylinder port. The lower piston now catches the full water pressure, and the cut-off nozzle and the exhaust valve are raised. As the tank empties the receding water level releases the exhaust-valve dogs, permitting the valve to close; the lower float also drops, reversing the controlling valve, and beginning a new cycle.

Each cycle requires ordinarily about 15 or 20 seconds, and a nearly constant air pressure is maintained in the pipe line throughout the cycle by the rising and falling of the water level in the air receiver. While the special field of this system is direct compression from natural heads of 200 ft. and more, it can also be used with an artificial head produced by a multi-stage turbine pump.

Treating Concentrates at Bellevue Limited Mine, W. A.

At the Bellevue Limited gold mine in Western Australia, owing to the copper in the ore, cyanidation cannot be used for treating the concentrates. As a result of pan-amalgamation experiments a unique process has been evolved, according to B. L. Gardiner (*Journ.* Chamber Mines, W. A., May, 1908), which consists of treating the roasted ore by the pan-amalgamation process, minus the mercury. The use of mercury is not required because a scale, consisting mainly of copper and iron salts, bound together by calcium sulphate, forms on the pans, on the riffles of Wilfley tables used to save any unroasted sulphides, and on iron scrap placed in the tailing launder. This scale, formed either by chemical or mechanical action, catches the gold. The gold-bearing scale is subsequently amalgamated in a clean-up barrel. By this method a saving of 90 per cent. of the gold is obtained, scale formed in the Wheeler pans used for grinding.

Professional Ethics for the Mining Engineer*

The Relations of the Mining Engineer to His Clients and to the Public. His Duty to Himself in These Different Relations

BY JOHN HAYS HAMMOND†

This is an era of "expansion;" and, conformably with the change in commercial conditions, the function of the mining engineer, as well as that of his confreres in many other professions, has also expanded. From his capacity of an engineer, limited to the determination of technical questions, the engineer of today has come to assume an economic importance in those branches of industry dependent upon engineering skill for their development.

He is indeed an engineer of limited usefulness who does not go farther professionally than to submit a purely technical report on subjects presented for his consideration. While he has the same responsibility as formerly in the solution of the technical problems involved, he is further expected to supplement his report with advice on the financial and commercial aspects of these problems. For the great majority of problems presented to the engineer ultimately involve the determination of the pecuniary relations of the propositions under consideration.

The great corporation lawyer no longer earns his fee by merely submitting his opinion as to the legal issues involved in law suits affecting the corporation; he now assumes charge of the entire legal work, including both the organization of the corporation and the maintenance of its legal status thereafter. In like manner, the engineer, whose report was, as I have said, formerly confined to the determination of the geological and other cognate features of a mining enterprise, is now expected, not only to embody information on these subjects in his report, but also to give his opinion whether the property offered for sale in pursuance of such an enterprise is worth the price asked for it.

Moreover, if he recommends the purchase of a property, he incurs a certain moral responsibility for its efficient management, inasmuch as his professional reputation depends upon the realization of his predictions as to the outcome of the investment. For this reason, the engineer passes from the rôle of an expert to that of a consulting engineer, bound to supervise both the technical and the business management of the property purchased by his clients.

With this additional responsibility, and the consequent increase of professional opportunity, comes an extension of the field covered by the ethics of the mining engineer. Our professional duty may be regarded from three points of view: First, the relation of our work to our employers; second, its relation to the investing public; and third, its relation to our individual interests.

Relation to Employers

The question has been often discussed among engineers, whether it is professionally proper to make a report for the seller of a mining property. Such practice has been sometimes condemned; but a little reflection will show that the condemnation is not warranted. For it is neither wrong nor unreasonable that the owner of a mineral property should desire to present such a statement of its nature and probable value as will secure the attention of possible purchasers; or that he should secure for such a purpose the assistance of one who knows how to make such a statement intelligently and in scientific language—that is, the language which will convey a definite meaning to those who know it—or that he should pay such an assistant for his skill and labor. It goes without saying that no expert in such a case, or in any other case, may suppress or misstate facts, or disguise or withhold his honest opinion, in a statement to which he lends his name. Yet, this being understood, it still remains true that a "vendor's report" is not advice to anybody to buy, at a stated price, but only a description of the property—usually without any mention of the price at which it would be to the purchaser a profitable bargain. There is nothing dishonorable or unprofessional in honestly making, for the owner of the property, such a description. But there is often danger that it may be afterward used as if it were advice offered to a purchaser. In any such report, therefore, the fact that it was made for the owner, or vendor, or his representatives, should be clearly stated beyond all misunderstanding, for the protection of both the author and the reader. This precaution being observed, I see no valid objection to the writing of such a report by a mining engineer.

Nevertheless, it is an undesirable kind of work, particularly for young mining engineers, whose reputation for integrity and judgment, not yet established by long practice, may be, justly or unjustly, placed in jeopardy by any such expression of their opinions, and may be destroyed, in public esteem, by the failure of any mining scheme with which their names may have been thus associated. In their own interest, they should accept such engagements with caution, and protect themselves with vigilance against illegitimate or misleading use of their statements. In short, they take, in such cases, a risk which older engineers, backed by a reputation already established, could better afford to take. As between the two classes, the question is one, not so much of ethics as of practical wisdom; yet we may fairly say that the avoidance of folly is, in no small degree, an ethical matter. It is worthy of notice that the wise proverbs and warnings of the Good Old Book often make no great distinction between "fools" and "sinners."

Contingent Fees

In this connection arises the question of the acceptance of contingent fees. It seems to me that an expert of established and unimpeachable reputation is perfectly justified in recommending the purchase of a property and accepting compensation from the promoters, *provided*, first and without qualification, that full publicity be given to the nature of his connection with the enterprise; and secondly, that his compensation be contingent, not upon the successful sale of the property, but upon the subsequent success of the undertaking. In other words, an expert who makes a favorable report upon a mining property for which he is to receive payment in money if the property be sold on his report, must needs have an unparalleled reputation for integrity to endure that revelation of this situation, which he cannot without dishonor withhold. But one who frankly avows that he is to be paid in the stock of the projected company and, therefore, as an investor of time, skill and labor, is on the same footing as the investors of money, occupies a much less vulnerable position. In either case, and in any case, there is no safety—and, I may almost add, no honor—outside of the frank and full publication of all such circumstances as might be afterward called in question, criticized or condemned.

This is the expert's Golden Rule: "Tell unto others, *now*, whatsoever you would not have them tell on you—with unjust misunderstanding and scandalous comment—hereafter!"

Commissions

Another question involved in the relations of a mining engineer to his employer

*Address delivered at the Chattanooga meeting, Oct. 1, 1908.

†President American Institute of Mining Engineers.

concerns the acceptance of commissions from the sellers of machinery, supplies, etc., the purchase of which he has made as agent, or recommended as adviser. In many instances of similar nature affecting other professions, this practice seems to be established and condoned, if not avowedly justified. It is even defended by ingenious sophistry, somewhat as follows: The manufacturers of certain articles are bound by trade agreements not to sell them below a certain price, or, in the absence of such agreements, do not dare to "cut" the price, for fear of, thereby, invoking savage reprisals from their competitors. But this minimum price includes the salary or commission paid to a regular selling agent. If, therefore, the agent of a customer makes a purchase direct, without the intervention of their sales agent, they are willing to pay him "the regular commission," though they are not willing to reduce by the same amount their bill to his employer. The argument is plausible from the manufacturer's standpoint; and indeed it is hard to judge him justly. For if, in a given case, in order to gain a customer, he undersells his competitors, he may be committing the heinous modern sin of granting a "rebate;" whereas, if he refuses to do this, he may be guilty of partnership in a wicked "trust" or "combine." The popular sentiment and legislative furore which condemns at the same time free competition in prices and every agreement to prevent such competition, needs, as President Roosevelt has, in substance, frankly declared, to be modified by common sense.

But we are not now concerned with the ethical or legal problems of the manufacturer. From the standpoint of the engineer, acting as a purchasing agent or adviser, the case seems to me as clear in the court of honor as it would be in a court of law. He cannot honorably accept a commission from the seller, while he is the agent of the buyer. If the custom of the trade permits the giving of such a commission, but not its deduction from the face of the bill rendered, he may, of course, honorably accept it and pay it over to his own employer—that being the only way in which he could secure the minimum net price in his employer's interest. But even in that event, he should place his honor beyond suspicion—as, for instance, by demanding the commission in a check to his own order, and indorsing the same check to the order of his employer. There may be exceptional cases in which the taking and keeping of a commission is justifiable, but one thing is clear beyond dispute: it is always wrong when it needs to be kept silent.

Loyalty to Employers

It sems almost superfluous to insist upon the duty of maintaining a spirit of loyalty toward employers. Yet this spirit is by no means as prevalent as a sense of honor, or even of enlightened self-interest, would demand. Loyalty to a corporation should be as unquestionable as to an individual. In neither case should it be sacrificed to feelings of personal resentment or disapproval. If one cannot "stand for" the policies or practices of one's employer, the straightforward course is to seek employment elsewhere.

There are two special spheres in which the mining engineer, like the members of other technical professions, maintains a double relation.

One of these is that in which, being himself an employee, he exercises the employer's authority over other employees. In such a position, while it is his duty to protect vigilantly his employer's rights and interests, he should realize that he cannot do this more effectively than by invariable justice, good-nature, respect and sympathy toward his own subordinates. Nothing contributes more to the success of an enterprise than the mutual exercise of these feelings between workmen and superintendents or managers. It is "team-work" that wins in industrial undertakings, as well as in the athletic field. And in these days especially, it is the cultivation of an *esprit de corps*, based upon truely friendly personal relations, which offers the best protection against the schemes of mischief-makers and demagogues.

Expert Testimony

The other double relation to which I have alluded is that which is occupied by an expert witness in a court of law. In this case, he is theoretically *amicus curiae*, a friend of the court, giving under oath his assistance in the recognition and interpretation of the facts of the case; and, for this reason, he is permitted to do what no ordinary witness can do, namely, to give opinions as well as personally observed facts, and to support these opinions by hearsay evidence or scientific authority and argument, not otherwise admissible as testimony. Yet, on the other hand, he is retained and paid by one of the litigant parties; and he would not appear in court at all, were it not reasonably certain beforehand that his testimony would support the theory and benefit the cause of his clients.

The ethics of this situation may be more clearly perceived, if we consider that, first and foremost, the expert witness must remember the obligation of his oath. He has not the same latitude as the attorney, whose official duty is to present a client's case, without declaring his private opinion about it. Consequently, the expert witness should be thoroughly convinced beforehand of the justice and truth of the cause or the theory in support of which he appears. Such a conviction ought to be based upon a careful and exhaustive previous examination of the case; and no expert should agree to testify in any case until such an examination has established his opinion, and qualified him to defend.

Concerning some aspects of this question, I would here refer, without further discussion in this place, to the suggestive address of Doctor Raymond, printed in the *Transactions* of the American Institute of Mining Engineers for November, 1906.

Relations to the Public

A more simple and congenial, yet more heavily responsible, relation is that which the mining engineer may be called to assume toward the public, as the responsible indorser of a proposed undertaking. In consideration of the confidence which he invokes and expects, notwithstanding the fact that he has been paid by interested parties, he assumes a sacred trust, obligating him to safeguard the interests of a wider and more important *clientele*. The investor has not the time, and perhaps not the technical knowledge required for the thorough study of a prospectus. He risks his money upon his belief in the ability and integrity of the engineer, who is, therefore, bound in prudence and in honor to be especially careful that his indorsement be clear and precise, without mental reservation or opportunity for misunderstanding. This caution applies particularly to what are called "gilt-edge" investments, that is, to enterprises so promising and so thoroughly investigated beforehand as to warrant their recommendation, on the terms stated, to the general public—that is, to unknown and probably unskilled clients. There are numerous instances in which the engineer has to give advice on speculative, though honest and legitimate, undertakings, such as the development of mining prospects, which should be confined to those who are willing, and can afford, to take greater risks in the hope of larger profits, than pertain to the "gilt-edge" class of mining investments.

Relations to Personal Interest

In connection with the class of advisory reports last named, it is good policy for the expert adviser to seek to acquire a special clientage among mining investors who will not be led to judge him by the results of a single case, but, knowing the wisdom and the successful outcome of his recommendations in other cases, will not condemn him when he turns out to have been mistaken. For such a disappointment, sooner or later, is inevitable, since no engineer, however able and careful, is infallible.

In my opinion, a mining engineer engaged in such consulting practice should aim to become himself a capitalist, and a purchaser and developer of mining properties. Should he acquire business experience he might become avowedly a promoter, in a high and worthy sense of that term, and thus assist in driving out the unscrupulous promoters who are really parasites. According to my observation, the swindling in mining enterprises is done mostly by laymen, and not by responsible

professional engineers or practical miners. The practical miner, indeed, is, in many instances, himself the victim of the unscrupulous promoter.

As already observed in considering the relations of the engineer to the public, it may also be repeated from the standpoint of his own interests, that he should use the greatest circumspection to prevent the use of his name in support of enterprises of which he has but a superficial knowledge. He may be quite willing to "take the chances," and invest some of his own money in a scheme which he would not be willing to take the responsibility of recommending to another party, dependent upon his judgment as a guide. But even such a private investment of his own money should often be avoided, lest his connection with the scheme as a simple stockholder should be construed as implying his deliberate indorsement of it as an expert.

It often happens that an expert who has won deserved reputation and public confidence is called to give advice concerning a district with which he is not personally acquainted. In such a case, his honest offhand judgment, based upon general knowledge and upon experience elsewhere, might mislead both himself and others. Yet it is practically impossible for an expert, visiting a given property or district for the first time, and, of course, known to all as the possible "advance agent" of capital, to get at the unfavorable conditions which it is everybody's interest to hide. I would earnestly recommend, in such cases, the engagement by the examining expert, at his own selection and cost, and without notice to any other party, of a local expert assistant, familiar with the conditions and history of the property concerned and of the district in which it lies—in other words, with those facts which a visitor cannot easily discover.

Conclusion

I am fully aware that these desultory remarks have covered but a small part of the field of professional ethics, even in a single branch of the professions represented by the institute. But I am not offering a code, or even an official and representative declaration of principles. My remarks are intended, and will, I hope, be accepted, simply as a contribution to that discussion of their theme in which every engineer of experience may participate.

The mineral output of New South Wales for 1907 was the largest in the history of the State, being valued at £10,577,378. An average of 43,758 persons were employed in and about the mines during the year.

It is said that for reheating copper and brass an inclosed muffle in which the flame does not touch the metal is best. However, it takes more fuel to heat this kind of muffle.

Lehigh Valley Coal Company

This company is a subsidiary of the Lehigh Valley Railroad Company, and operates the anthracite coal lands controlled by that company, being the nominal owner of those lands. The report is for the year ended June 30, 1908.

The production of anthracite coal from the lands owned and controlled by this company, and of bituminous from the Snow Shoe district, which it also controls, was as follows, in long tons:

	1907.	1908.	Changes.
Anthracite	8,867,255	9,263,899	I. 396,644
Snow Shoe bit'inous	187,390	276,153	I. 88,763
Total	9,054,645	9,540,052	I. 485,407

The income account of the company is given as follows: Surplus, July 1, 1907, was $1,787,864; net income for year, $388,606; total, $2,176,470. Royalty settlements and miscellaneous adjustments were $199,625, leaving a balance of $1,976,845 at the end of the year.

The Lehigh Valley Coal Company has outstanding $1,965,000 capital stock; $13,208,500 bonds; $10,537,000 certificates of indebtedness, the latter representing advances made by the Lehigh Valley Railroad Company.

The report says: "The Lehigh Valley Coal Company and affiliated companies mined and purchased during the year 85.7 per cent. of the anthracite coal transported by the Lehigh Valley Railroad Company.

"The policy of extensive underground development of the coal lands for the purpose of not only maintaining the present tonnage, but materially increasing the same, together with the improvement of breakers, haulage and pumping plants and the coal-mining machinery generally, was continued throughout the year. In addition, much has been accomplished in the matter of concentrating the various plants so as to produce the lowest possible cost of operation.

"A new breaker is being constructed at Spring Mountain for the purpose of opening up additional territory in the Jeanesville coal lands, and will be placed in service during the next fiscal year, the expenditures to date being $167,111. When completed, it is proposed to concentrate at that colliery the preparation of coal now handled at Spring Brook and Oneida, the breakers at these two points having reached a condition that will soon prevent further economical operation. Heidelberg No. 1 breaker was enlarged and is now handling, in addition to its usual tonnage, the coal mined at Heidelberg No. 2 breaker, the latter being unfit for further service. Hazelton No. 1 breaker was rebuilt and enlarged during the year at an expense of $90,188, and on a basis that will permit of preparing an increased tonnage at a reduced cost. An underground electric-haulage system was installed at Westmoreland colliery in order to handle the increased output at that point. A new washery was erected at Prospect colliery, and another is now being built at Beaver Meadow.

"The improvements already made, together with those now in progress, tend not only to offset the increased expense of mining incident to the greater depth of the workings and the longer underground haul, but also result in a greater percentage of prepared sizes of coal, the same having increased 9.4 per cent. in the last five years.

"The new steel and concrete coal-storage building and dock with necessary machinery for handling anthracite coal at Milwaukee, and a similar plant at South Chicago, replacing on a much larger scale one at that location destroyed by fire, were completed in the early part of the year. The total cost of these plants, which have an aggregate capacity of 195,000 tons, was $795,976. The coal-storage and shipping dock at West Superior was enlarged by the addition of an egg-coal storage and handling plant. New coal trestles and pockets were built at Geneva and at Syracuse.

"The total additions and betterments made to the property during the year amounted to $755,129.

"All of the capital stock of the Wyoming Valley Coal Company was acquired from the Lehigh Valley Railroad Company in the month of February, the latter receiving in payment therefor treasury stock of the Lehigh Valley Coal Company to the par value of $350,000. The property of the company thus acquired consists of about 1400 acres of valuable coal lands held in fee or by perpetual lease. To the greatest economies in administration, the operations and accounts of that company, including the bonded indebtedness and net earnings from the date acquired, were merged with those of the Lehigh Valley Coal Company."

The coal traffic of the Lehigh Valley Railroad for the year was as follows:

	1907.	1908.	Changes.
Tons coal mined	14 144,482	14 522,262	I. 377 770
Coal ton—miles	2,021,909,527	2,221,951,783	I. 200,042,256
Ave. haul, miles	142.95	153	I. 10.05
Reve. from coal	$15,270,214	$16,175,280	I. $905,066
Av. per ton-mile	0.755c.	0.728c.	D. 0.027c

Coal formed 54.8 per cent. of the total tonnage hauled. The revenue from coal was 45.6 per cent. of the total earnings of the road last year. The increase last year was entirely in anthracite, bituminous coal and coke having fallen off heavily in the second half of the year.

Up to the end of 1907, New South Wales had produced 13,034,001 oz. fine gold. The gold production for 1907 was 6624 oz. less than that for 1906, being 247,363 oz. fine gold.

In cyanide plants on the Rand, sands are sometimes distributed into the sand-treatment tanks by discharging them upon the apex of an octagonal pyramid.

The Nature of the Volatile Matter in Coal*

By Horace C. Porter and F. K. Ovitz

In connection with the fuel investigations being conducted by the technologic branch of the U. S. Geological Survey, a special effort is being made to determine the chemical and physical structure of coal. The chemical investigation is being pursued along three special lines: (1) the chemistry of combustion in the furnace, that is, determining the chemical composition of the hydrocarbons given off during the process of combustion; (2) the hydrocarbons which are given off at different temperatures, starting with a normal temperature and determining the nature of the hydrocarbons given off at each of a series of successively higher temperatures from the normal to the temperature of the ordinary furnace; and (3) the hydrocarbons existing in the coal at normal temperatures to be determined by solution and subsequent analytical methods.

A paper presented by Dr. Horace C. Porter, at the June meeting of the American Chemical Society, of which the following statement is an abstract, relates to the second of these three lines of investigation:

It is a familiar fact to retort coke-oven and gas-works operators that the volatile products of coal are largely affected both in quantity and character by the conditions of temperature and rapidity of the rise of temperature in the coal, and by the conditions to which the products are subjected after leaving the coal. The usual laboratory determination of volatile matter serves almost universally as a more or less valuable indication of the coal's adaptability to industrial uses either for combustion, destructive distillation, or gasification. The method for this determination is, however, an arbitrary one and does not duplicate closely that of any industrial operation, nor is the character of the volatile matter produced by the laboratory method known with any degree of certainty. Furthermore, the results by the laboratory method are sensitive to varying conditions and the influence of such variation on the character of the volatile products has not, heretofore, been the subject of extended study.

Importance of the Volatile Matter

The importance of the rôle played by the volatile matter in all industrial applications of fuel is generally recognized. There are more heat units in the volatile matter in proportion to its weight than in the fixed residue. Pittsburg coal containing 30 per cent. volatile matter and 7 per cent. ash has 36 per cent. of its heat value in its volatile matter, as shown by comparing the heat values of coal and coke. When coal is fired under a boiler either by hand or mechanically, it first undergoes a process of distillation, and both the quantity and quality of the volatile products and the relative ease of their liberation are concerned largely in the boiler efficiency and the production of smoke. It is reasonable to suppose that coals of different origin may yield volatile gases carrying different percentages of tarry vapors and heavy hydrocarbons and may on that account differ in smoke-producing tendencies. A knowledge of the chemical reasons why coals smoke in varying degrees, and why volatile coals are hard to burn with maximum efficiency is a necessary preliminary to the taking of intelligent steps toward improvement in these respects.

The gas producer for bituminous and low-grade fuels is coming more and more into favor. Here also the volatile matter in the fuel plays an important rôle, since at the top of the fuel bed a process of distillation is continually going on. A certain proposed new type of producer will utilize high-volatile fuels, such as bituminous coal, lignite, peat and wood, by passing the hot gases from the producer through the raw fuel in a series of preliminary chambers, thus distilling the valuable hydrocarbon gases (as well as ammonia) out of the fuel before it is charged into the producer itself.

Attention need hardly be called to the preëminent importance of the volatile matter of coal in the illuminating gas and by-product coke-oven industries. It is of interest to note, however, the increasing favor accorded by the gas industry to the vertical gas retort as most successfully operated by the Bueb system at Dessau, Germany, and to explain that one advantage of this process lies in avoiding decomposition of certain valuable gases in passing over heated surfaces, as occurs in the ordinary processes, although at the same time a higher gas yield is obtained by using higher temperatures in the retort itself.

Purpose of the Investigation

The purpose of the investigation described in this paper has been:

(1) To throw light on the nature of the volatile products from coal, and on the manner in which they are affected by the conditions prevailing during their formation or to which they are subjected after formation;

(2) To contribute, in the interests of smoke abatement, some data on the comparative amount and character of the gases and vapors distilled from different coals at low temperatures, a subject intimately concerned in the production of smoke;

(3) To prove experimentally that the volatile product of coal is to some extent incombustible, and that the proportion of inert volatile varies in different coals; and finally,

(4) To show that the oxygen of coal is in many cases evolved in the volatile matter very largely in combination with carbon as CO and CO_2 as well as with hydrogen as water, thereby explaining in great degree the discrepancy found in these cases between the determined calorific value and that calculated by Du Long's formula.

Deterioration in Heating Value at Ordinary Temperatures

In connection with a series of experiments not yet completed, on the deterioration in heat value of various coals during storage under different conditions, a liberation of gas in remarkably large quantities was found in certain cases. About 25 lb. of bituminous coal of buckwheat size was stored in a 5-gal. glass bottle closed with a rubber stopper, which was provided with glass tubes for removing gas samples. The bottles stood in the laboratory at a normal temperature. In some of the bottles the coal was immersed in distilled water and the interstices well filled with water by attaching a partial vacuum for one hour. About 400 c.c. air remained above the surface of the water.

TABLE 1. ANALYSIS OF COAL USED IN EXPERIMENTS.

	Moisture.	V. M.	F. C.	Ash.
Connellsville, Pa.	1.10	30.67	60.35	7.88
Ziegler, Ill.	7.67	30.38	54.32	7.63
Sheridan, Wyo.	9.15	39.93	42.92	8.00
Pocahontas, W. Va.	0.35	20.93	75.51	3.21

The gas liberated during these experiments consisted almost entirely of methane with a slight amount of CO_2, and no more than doubtful traces of CO and heavy hydrocarbons. No hydrogen could be detected by the palladium fractional combustion method. Whether this gas may properly be considered as volatile matter due to decomposition of the coal, or whether it is held in the coal as such by occlusion or absorption cannot be decided without further study. The fact that the oxygen of the air surrounding the coal was rapidly absorbed without forming CO_2, indicates a change of composition in the coal. It is reasonable to suppose that a larger quantity of gas escaped between the mining of the coal and the starting of the experiments than was measured during the experiments. The measurement of quantity of gas formed is, therefore, of little value. The gas pressure in the case of one coal immersed, reached at one time 7 in. of mercury.

A series of experiments conducted primarily for direct weighing of moisture driven off from coal at 105 deg. C. yielded

*Presented with the permission of the director, U. S. Geological Survey.

results incidentally which showed the extent of the loss of substances other than moisture, principally CO_2 in small percentages.

In studying the nature of the volatile matter at the medium and higher temperatures (500 deg. to 1100 deg. C.) two sets of experiments were run using a different apparatus in each. In one case, a small sample (10 grams) was heated in a platinum retort suspended in an electric-resistance furnace maintained constant at the desired temperature, the gases evolved being collected by displacement of water in a bottle. No attempt was made in this set of experiments to duplicate the methods or results of industrial practice. The apparatus was designed with the idea of maintaining definite and controllable conditions which would yield results comparable with each other in experiments on different coals. The other set of experiments was run on a somewhat larger scale, heating 400 grams of coal in a cast-iron retort resting in a cylindrical electric resistance furnace, the tar, water, ammonia, CO_2, H_2S, and gas being collected in appropriate absorption apparatus and measured. Owing to the heavy nature of the retort and the large sample of coal, the temperature in the coal could not be varied as easily in these experiments as in those using the platinum retort. Accordingly, one set of conditions was adopted approximating as nearly as possible those of industrial by-product coke-oven practice, and a number of typical coals compared under these conditions.

TABLE 2. AVERAGE RESULTS OF 10 GRAMS AIR-DRIED COAL.
(10 Minutes Heating.)

Coal.	Highest Tem. in Coal.	Tar.	Water.	Gas (ccs)	Gas Composition. (Calculated to undiluted gas.) CO_2	Illum.	CO	CH_4	(a) C_2H_6	H_2	N_2
10 *minutes heating at* 500°:											
Connellsville, Pa	335	....	....	8	30.0	0	6.5	6.5	7.0	0	50.0 (b)
Ziegler, Ill.	325	....	....	90	14.8	0	5.3	8.0	....	0	71.9 (b)
10 *minutes heating at* 600°:											
Connelsville, Pa	441	4.9	3.2	190	6.3	8.2	5.9	36.9	23.7	2.0	17.0 (b)
Ziegler, Ill.	440	6.8	13.0	173	15.7	7.0	14.4	19.0	22.2	2.8	18.9 (b)
10 *minutes at* 700°:											
Connellsville, Pa	562	11.0	3.5	583	3.0	7.2	5.4	44.1	17.7	13.5	9.1
Ziegler, Ill.	545	7.8	14.0	471	8.5	5.1	13.7	59.6	0	1.1	12.0
Sheridan, Wyo.	580	8.2	18.5	1020	28.8	3.7	20.0	18.6	6.8	15.1	7.0
Pocahontas, W. Va.	599	4.2	1.9	675	1.9	4.4	3.9	44.4	16.1	28.5	0.8
10 *minutes at* 800°:											
Connellsville, Pa	687	12.6	4.5	1375	1.5	5.5	6.9	24.9	12.1	33.1	16.0 (b)
Ziegler, Ill.	680	9.3	13.9	1251	3.8	3.8	16.0	27.7	6.1	33.7	8.9 (b)
Sheridan, Wyo.	.....	7.9	19.1	1780	19.8	2.7	21.4	14.1	4.0	30.0	8.0
Pocahontas, W. Va	.....	6.5	2.4	1590	1.2	3.4	4.8	24.4	11.6	43.2	11.4

(a) Includes all higher paraffin hydrocarbons calculated as C_2H_6.
(b) Includes small amount of air.

Series of Tests on 10 Grams of Coal in a Platinum Retort

The series of tests on 10 grams of coal in a platinum retort, at various temperatures, is not yet completed but has yielded sufficient results to show their approximate agreement with those obtained on 400 grams of coal and also to indicate the composition of the gas produced from different coals in the early stages of heating at low temperatures. A thermo couple was inserted in the retort so as to determine the temperature under the surface of the coal itself. The tests were run in an atmosphere of nitrogen which was passed through the retort until the exit gases contained less than 1 per cent. oxygen. The tar was collected in two 6-in. tubes of absorbent cotton heated to 100 deg. C. and also weighed on the neck of the retort. The water was collected in a 5-in. $CaCl_2$ U-tube, and always contained a slight amount of light oil driven over from the tar causing an error of 1 per cent. or less.

TABLE 3. ABSOLUTE QUANTITIES OF SMOKING AND NONSMOKING PRODUCTS.*
(10 Minutes Heating.)

Designation of Coal.	Temperature. Furnace.	Coal.	Smoking Products. Tar, Per Cent.	Gas (ccs.) Illum.	Ethane, etc.	Total.	Nonsmoking Gases (ccs). CO_2	CO	CH_4	H_2	Total.
Connellsville, Pa.	500	335	....		0.6	0.6	2.4	0.5	0.5	0	3.4
Ziegler, Ill.	500	325	....	0	0	0	13.5	4.7	7.2	0	25.4
Connellsville, Pa.	600	441	4.9	16	46	61	12	11	71	4	98
Ziegler, Ill.	600	440	6.8	12	39	51	28	25	33	5	91
Connellsville, Pa.	700	562	11.0	42	103	145	18	31	256	78	383
Ziegler, Ill.	700	545	7.8	24	0	24	40	64	281	5	391
Sheridan, Wyo.	700	580	8.2	38	69	107	294	204	190	154	842
Pocahontas, W. Va.	700	599	4.2	30	109	138	13	27	300	192	532
Connellsville, Pa.	800	687	12.6	76	166	242	21	95	343	458	917
Ziegler, Ill.	800	680	9.3	47	76	123	47	200	346	420	1013
Sheridan, Wyo.	800	...	7.9	48	72	120	355	381	254	534	1524
Pocahontas, W.Va.	800	...	6.5	54	186	240	19	77	390	691	1177

*10 grams of coal.

Smoke Formation and the Composition of Low-temperature Gases

From the results given in the accompanying tables, it may be seen that the low-temperature gases are high in illuminants and the higher homologues of methane, and low in hydrogen. Comparing the four coals at 700 deg. (565 deg. in the coal) where the gas begins to be formed in considerable amount, the Connellsville is the richest of the four coals in illuminants and heavy hydrocarbons and the Pocahontas the highest in hydrogen. The high CO_2 and CO from the Illinois and Wyoming coals accords with other experiments on these coals. The tar at 700 deg. is greater also in the Connellsville coal. The smokeless character of the Pocahontas coal may be connected more or less with the presence of considerable hydrogen in its gas at low temperatures, since the low ignition point of hydrogen tends to assist in the burning of other gases present.

The smoke-producing constituents of the volatile matter are here considered as including tar, and the heavier hydrocarbon gases; benzine, ethylene and homologues of methane (calculated as C_2H_6). While at 440 deg. (in the coal) the Illinois coal (and probably also the Wyoming) has produced more smoky gases than the Eastern coals, at 565 deg. and higher, the Connellsville produces much more. This accords with the finding in practice of greater difficulty in burning coals of the Connellsville type without smoke.

Conclusions Drawn From Experiments Made

1. Some coals liberate gas during storage, of a composition similar to that of natural gas, and some coals rapidly absorb oxygen from the air during storage without forming CO_2.

2. During drying in air at 105 deg. C. some coals lose appreciable amounts of CO_2, and most coals take up oxygen to a considerable extent, but none of those tested show any considerable formation of combustible gases.

3. The nature of the volatile products distilled from several coals at low temperatures in the early stages of heating vary in different coals in accordance with their smoke-producing tendencies.

4. The volatile matter of coal comprises a considerable proportion of non-combustible matter varying with the type of coal.

5. A modification is suggested of Dulong's heat value calculation for coal based on experimental results showing the distribution of oxygen between hydrogen and carbon.

The Mine Telephone and Its Advantages

SPECIAL CORRESPONDENCE

Whether the operations are large or comparatively small, a well organized mine cannot afford to be without a telephone system. An important item in connection with having telephone service in the mines is the saving effected by being able to notify the men working in the different parts of the mines of an unexpected shut-down of some of the various machinery, or a change in the working plans of the mine. Mine operators are frank to say that the cost of the system is soon repaid by the presence of this feature alone. It is a well known fact that the operation of most mines is dependent upon a variety of uncertain conditions, such as scarcity of cars, break-downs of machinery, floods, etc., rendering it impossible to anticipate a temporary suspension of work in advance of its actual occurrence.

The fact that a superintendent of a mine can remain in his office and be in direct communication with every corner of the workings, is an item of importance that we cannot pass without considering seriously.

METHOD OF INSTALLATION

The cost of constructing a line underground is usually less than outside, because no poles are required and there are no holes to dig. The magneto system does not require an expert to install it, and about all the work required of the mineowner is the placing of the instruments to the best advantage and the stringing of line wires. This is simply and quickly done by running wires through the various entries and down the shafts on standard wood brackets equipped with the regular common glass insulator. In a large number of mines, rope haulage is used to convey the ore to the surface and where such is the case, a metallic signal line is usually run along the side of the entry to transmit signals to the engineer. If such a condition exists, it is only necessary to connect any number of bridging telephones to the circuit. In this case no expense is incurred beyond the first cost of the telephone and the cost of connecting them up. The expense of maintenance is usually very light, because the lines being underground, are not subject to atmospheric conditions such as are present outside and trouble from lightning is unknown.

Although ordinary iron line wire has been used with success in some mines, the safest construction can be furnished at little additional cost by supplementing rubber-covered wire for all the underground circuits which are in any way subject to moisture or dampness from contact with timbers, etc. Some conditions are so uncertain that it has been considered good practice to use lead-covered cable, providing the installation warrants the expense. In any event this part of the equipment should not be slighted, and the best is usually the cheapest; by installing cable, an increased degree of certainty is, of course, assured.

TELEPHONES ARE BUILT TO WITHSTAND ATMOSPHERIC CONDITIONS

Mine telephones are unlike other telephone instruments, and should be complete and compact and especially built for use in mines. The instruments shown in the accompanying illustrations are designed to withstand the severest atmospheric and climatic conditions, and being of the iron-clad type, are suitable for outdoor and underground installations, where an instrument of this kind is required to give service under such conditions. The design should be such as to afford the greatest accessibility of all parts and at the same time provide ample protection, eliminating the exposure of any parts when the instrument is not in use. The door on this type of telephone usually closes against a rubber gasket so as to hermetically seal the entire contents. The only part of the instrument that it is necessary to handle is the receiver, which should be of a thoroughly insulated and efficient type. The design illustrated, Fig. 1, shows the receiver hanging on the inner door, which is temporarily fastened by machine screws and only accessible to the inspection of the man in charge of the system.

Access to the inner compartment is only necessary for replacing batteries. A notable feature in this arrangement is incorporated in the design of the ringer, which is so arranged that its coils are inclosed inside the inner compartment, whereas its vibrating mechanism, consisting of the armature, clapper rod and gongs, mount on top of the case and are protected by an iron dome which is removable after taking out the mounting screws. It is necessary that careful attention is given to the construction of the compartment containing the essential parts of apparatus. In this type of telephone, a felt-ring gasket for the inner-compartment door, as well as a rubber gasket between the ringer-mounting plate and the top of the iron case is provided. Impregnation by water or gases is absolutely impossible.

Individual parts of the mine telephone require special treatment as regards finish. The iron case is treated with a special insulating compound that effectively preserves it from water, dampness and the acid fumes present in mines. All windings

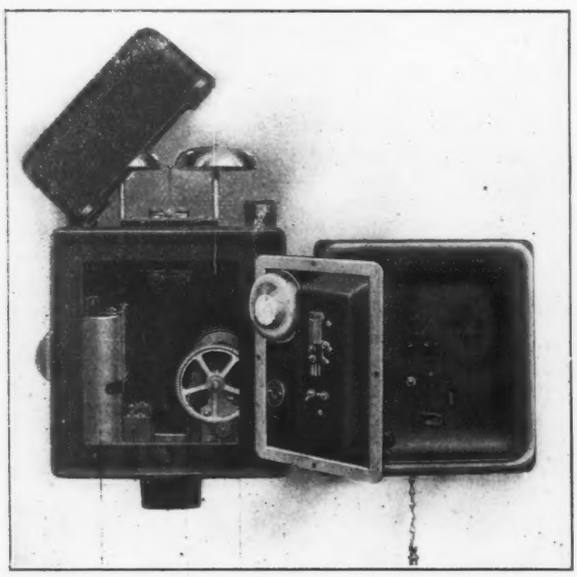


FIG. 1. MINE TELEPHONE SHOWING INTERIOR MECHANISM

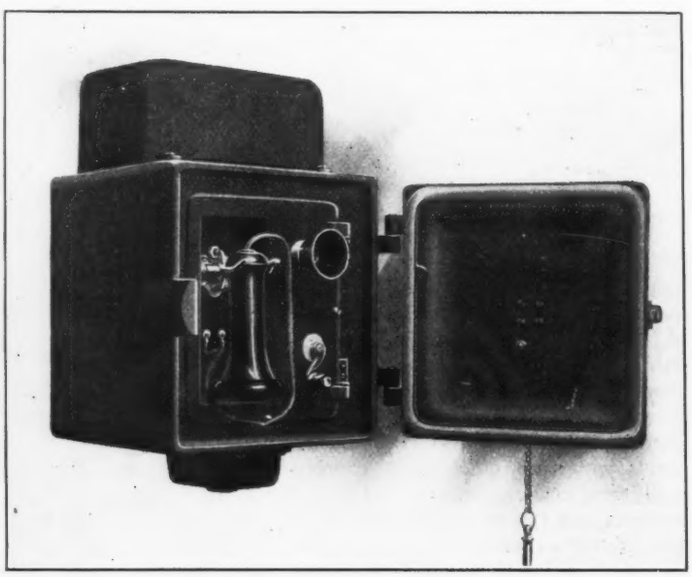


FIG. 2. THE RECEIVER IS GENERALLY ATTACHED TO THE INSIDE DOOR

for the ringer, induction coil, generator, etc., are especially insulated and boiled in oil as an additional precaution and insulation. Wherever it is possible to substitute brass for iron in the construction of the mechanism, it has been done so as to eliminate a chance of having parts in the instrument that might rust. The parts that are necessarily of steel, because of forming a part of the magnetic circuit, are taken care of by the zinc plating. Every feature in this type of telephone requires the most careful construction as well as assembling.

DIMENSIONS AND EQUIPMENT

The mine telephone illustrated, is manufactured by the Stromberg-Carlson Telephone Company, Rochester, N. Y., and measures over all, 10 in. wide by 10¾ in. high by 8¼ in. deep, and is considered the smallest and most compact instrument of its type for this particular service. The detachable mounting bars permit the instrument to be mounted without opening the door or the hood, and being detachable, permit fastening the bars in a horizontal or vertical position, depending upon the nature of the surface on which the instrument is to be placed. A standard magneto equipment of the highest efficiency, especially finished, as hereinbefore mentioned, includes a five-bar generator and a 1600-ohm ringer, which is the standard for most installations.

It is quite essential that a door is provided for this type of instrument that is easy to open and easy to close; at the same time producing a pressure that will assist the gasket to make the instrument air-tight. This is conveniently provided in the form of door illustrated, which provides a handle that acts as a lever, which forces the door tight, and is held in place by a dowel pin attached to the outside of the door as illustrated. This form of pin-lock is instantly opened by pulling out the pin. Some mineowners do not prefer free access to the telephones, so a lock on the same principle has been provided that opens with a key and lock as an ordinary spring door lock. These parts are interchangeable and can be put on after the telephones leave the factory by taking out screws from the inside of the door.

It would require much time and space to enumerate the many advantages obtained from the use of telephones in mines. However, the principal benefit is undoubtedly in the case of accidents, whether they be to the working machinery or to individuals. Nothing gives the superintendent of the mine such complete control over all parts of the mine workings as a connecting system of telephones.

In thin seams where coal cutters are employed the rapid clearing of the machine-cut coal necessitates some quick and efficient method of haulage. This difficulty can best be solved by the introduction of mechanical coal conveyers.

Coal Trade and Mining Conditions in Indiana

The thirty-second annual report of the Indiana department of geology and natural resources, compiled by W. D. Blatchley, state geologist, and just received from the printer, includes the annual report of James Epperson, inspector of mines for Indiana. Mr. Epperson's report presents interesting information relative to the coal trade, or mining industry in 1907, coal and labor statistics and mine casualties. Mr. Epperson also recommends legislation for the benefit of miners. The report says that "conditions of mining and coal trade during the last year were exceptionally good. The production for the year was 12,375,482 tons of bituminous coal, an increase of 1,700,125 tons, or a fraction over 15.9 per cent. over that of 1906; 875,233 tons of block coal, an increase of 128,563 tons, or a fraction over 17 per cent. increase in block coal over the production of 1906. The total production of the mines of the State was 13,250,715 tons, a gain of 1,828,688 tons over 1906. Of this tonage, 7,112,376 tons was consumed in Indiana and 6,138,339 tons were shipped to markets outside the State.

The total wages reported from the bituminous mines was $10,487,623, a cost of 84.7c. per ton of coal produced. Total wages reported from the block coalfield was $1,230,199.23, or a cost in wages for production of $1.40 per ton.

Selling prices during a greater portion of the year were fair, ranging from a minimum of 88c. to $1.54 per ton f.o.b. cars at the mine for bituminous mine-run coal. A fair average for the year would probably be $1.20 per ton. The prices of block coal ranged from $2.25 to $3 per ton for screened coal f.o.b. cars at the mine, $2.60 being a probable average for the year.

There were two important factors, which in addition to a strong demand for coal during a greater portion of the year, played an important part in the average increase in the output, namely, the car service on all the railroads was much better than in former years, and strikes and labor troubles of consequence were comparatively few. These conditions enabled the mines to be operated more days than in former years, resulting not only in an increase in production, but a large increase in the total wages earned by the mine employees. The report shows a total of 19,009 employees in 1907, a decrease of 453, or a fraction over 2.3 per cent. under 1906. There was an aggregate of $11,717,822.54 paid in wages, or $616,43 per mine employee; this shows an increase of $107.05, or a fraction more than 24 per cent. over the average wages in 1906, showing a higher average earning per employee than ever before in the history of the coal industry in the State.

In discussing labor conditions among miners in 1907, Mr. Epperson says: "There were no strikes of serious consequence and labor conditions, taking the State as a whole, were generally satisfactory to all concerned. The year was prolific of many local disputes between operators and miners, resulting in miners being idle, but usually the disagreements involved only employees at individual mines and covered periods ranging in length from two to ten days. Continuing, Mr. Epperson says, "the Terre Haute agreement, providing that when miners come out, or stay out of the mine for the purpose of redressing a grievance, real or supposed, thus partially, or wholly shutting down mine or mines contrary to agreement, each employee so ceasing or refraining from work shall be fined in the sum of one dollar per day during such shutdown, said fine to be deducted from the miner's wages, has had much to do with eliminating coal strikes." This section of the contract, Mr. Epperson says, is one of the most effective ever entered into between two associations and the results of its operation have been gratifying to miners and operators.

Mr. Epperson regrets that his report had to await the report of the geologist, since it might have been made public some time ago.

The Education of Coal Miners

The Lehigh Valley Coal Company is about to inaugurate a school for miners which will give the rank and file of mine employees the opportunity to learn mining from experts. They are to be taught not only mining practice, but how to protect themselves, and furthermore are instructed in the engineering problems met in their daily work. The school is to be located at Lost Creek, Penn. It consists of a regulation school room and a reference room well stocked with mining periodicals and books.

It is expected that this educational work will materially lessen accidents due to carelessness and ignorance. If this venture proves successful, the company plans to establish about a dozen similar schools in the different mining districts. The company's aim is to produce men trained in the theory and practice of mining, and thus fill positions of responsibility. A report of each man's progress is to be made, and those winning the highest marks will be selected for promotion.

The value of coal washing is clearly demonstrated by the results of the tests made by the United States Geological Survey. The 101 tests made showed a reduction in ash of from 20 to 60 per cent., and a reduction in sulphur of from 10 to 50 per cent. The cost of washing coal in the United States is from 8 to 18c. per ton.

Colliery Notes

Nearly 15,000,000 tons, or more than 36 per cent. of all the coal produced in West Virginia is machine mined.

A tank used for hoisting water at a shaft mine near Hazleton, Penn., holds 2000 gal. and is hoisted 95 times in an hour; 950 tons of water are raised every hour.

The presence of air in a condenser is due to leakage through the glands of the low-pressure cylinder and the joints along the exhaust pipe in which the pressure is below that of the atmosphere.

While open-air storage of coal is cheap and flexible, and is only moderately liable to spontaneous combustion, the coal is apt to deteriorate rapidly. The loss in calorific power may be as high as 50 per cent. in a year.

New Zealand was the first British colony to put in practice the system of state ownership of mines. The available coal supply of the colony is estimated at 1,200,000,000 tons, 1,180,000,000 tons of which are still untouched.

Iron and steel pipe may be distinguished by a flattening test. Soft-steel pipe, cut in very short lengths or rings, flattens smoothly and evenly without breaking, while wrought-iron pipe usually fractures at two or more places when flattened.

A surface condenser should only be installed in extreme cases, when the water available for condensing purposes contains such a large amount of impurities that it is not suitable for boiler feed, or when a high vacuum is of great importance, as for steam turbine work.

A Barcelona, Spain, firm of coal merchants makes contracts with firms employing steam power, to evaporate so many tons of water a week at a given price, the coal merchant employing any kind of coal he cares to use. The system practically means that the coal merchant sells steam instead of coal.

In order to insure a regular supply of timber, it is often advisable for mining companies to own and operate their own timber land. In order to have a permanent supply, the cutting should be carefully done, and ample fire protection should be given the standing timber. All timber should be peeled as soon as it is cut and allowed to season while waiting to be transported.

Recent reports of Welsh colliery owners show that large profits have been made during 1907 and the first half of the present year. In some cases the profits have even exceeded those of the great boom period of 1900-1901, and if the average net gain for all the collieries in the Welsh coalfield could be ascertained, it would be found that the twelve months ended June, 1908, were the most prosperous in the history of the coalfields.

The laws of resistance as applicable to mine ventilation may be stated as follows: 1. Resistance varies directly as the rubbing surface; the greater the area of roadways, sides, floors, etc., the air has to pass over, the greater the resistance to be overcome. 2. The resistance varies as the velocity squared. 3. The resistance varies directly as the area. When planning a system of ventilation, it will be found that these laws embody the whole principle.

The important thing to be borne in mind in making laboratory tests of coal is that the small sample tested should be so procured and prepared as to represent the whole of the coal for which the sample analysis or test will be taken as a basis. The whole should equal the "basis value" of the part. The sampling of coal is always a difficult matter, owing to the fact that the structure of even a small piece of coal is never uniform throughout, and that it is usually large pieces that have to be sampled.

The Dublin and Central Ireland Electric Power Company, in Ireland, has arranged to purchase 500 acres of peat bog to be used for generating electricity by means of the peat gas. The promoters propose to use a process common in Germany by which the expense of drying is somewhat reduced; the process calls for the retention of 50 per cent. of the 90 per cent. of water contained in peat. The revenue from the by-products such as sulphate of ammonia, which alone would pay the cost of drying, will still further reduce expenses.

Where coal has a long distance to drop, when being loaded into the hold of a vessel, the use of an "anti-coal breaker," which consists of a system of buckets balanced to run by gravity over a suspended shaft, the whole being suspended from the jib of an electric crane, will prevent the breakage and consequent loss of value that is sure to result from the ordinary methods of loading. This machine has a lifting speed of 25 ft. per min.; the speed of the bucket chain is capable of being regulated by an automatic centrifugal brake to a velocity of 120 ft. per minute.

Peat coke is being extensively manufactured in Benerberg, Bavaria. The Ziegler process is used. The peat is cut up, pressed and exposed to the air until the water in its composition is reduced to less than 25 per cent. of the whole mass. It is then placed in a retort for 18 hours. The coke is finally received in air-tight iron cars which are allowed to cool six or eight hours before being discharged. The yield per retort per 24 hours is from 8 to 10 tons. The gas generated, after passing the various processes of being separated from its by-products, is employed in assisting the retort process.

When nitro-glycerin or nitro-cellulose compounds fume or burn quietly away instead of detonating, the resulting gases instead of being carbon dioxide and nitrogen, become carbon monoxide and nitric oxide. This latter gas is one of the most treacherous met with in mines. Air containing enough nitrous fumes to irritate the nose and air passages is dangerous and has caused many deaths, as it frequently produces an intense acute bronchitis which is often fatal within 48 hours. Fortunately this gas is readily detected by its characteristic smell of fuming nitric acid; great care should be taken by the workmen in returning to the face after a blast if this smell is distinct.

A roller journal having two recesses, in either of which the spindle of the roller may be placed, is much superior to the ordinary type of roller in that: (1) The roller cannot be forced out of its journals and thereby be a hindrance to the traveling cars; (2) the recesses, to a great extent, are covered, and so prevent the admittance of dust and dirt; (3) there are really two journals in one for a small increase in cost, and (4) if the spindle of the roller is placed in the nearest recess to the traveling cars and a clip unduly strikes the roller, the spindle is forced into the recess opposite, thus reducing the shock on the clip, and, in consequence, to the rope. The journal may be fixed either on a level road or an inclined road, but if used on an inclined road, the spindle should always be placed in the recess nearest to the traveling cars. It will be found that in addition to the advantages above named, roller journals of this kind reduce the amount of oil used, and, in consequence, the cost of labor and oil, while the oiling is done much more efficiently; also the life of the rope may be nearly doubled.

Boys and women employed as slate pickers in Russian coal mines receive from 20 to 25c. per day, while pony drivers receive from 40 to 50c. per day. The miners, who work under a contract system, are paid according to the amount of work done. A contractor takes a contract to mine a certain amount of coal, employing his own workmen at as low a wage as they will agree to accept. The average miner earns 80c. per day, or about 12½c. for every 35 poods of coal mined (36 lb. to a pood). They are also expected to do their own timbering, without additional compensation. Many companies furnish free coal to their employees, and to the unskilled laborers, who earn about or less than $10 per month, with free house rent. Managers and foremen receive about $25 per month, free house rent and coal. Coal mined at a cost of 12½c. per 35 poods retails for 5c. per pood; there is, therefore, a profit of about $1.60 on every 35 poods mined, or $11 on the day's work of each miner. The most competent miners earn about $20 per month. Their wages are, however, greatly reduced by the frequency of holidays, there being but 220 working days in the Russian year.

The Meeting of the American Institute of Mining Engineers

EDITORIAL CORRESPONDENCE

The 95th meeting of the American Institute of Mining Engineers was opened Thursday evening, Oct. 1, at the Hotel Patten, Chattanooga, Tenn., President John Hays Hammond in the chair. Following this session a short informal reception was held. The following day the members and guests of the Institute were taken in automobiles for a ride through Chickamauga Park. On Saturday a visit was made to Hale's Bar on the Tennessee river, where the lock, dam and power plant now under construction were inspected.

On Monday, Oct. 5, a visit will be made to the mines and furnaces of the Roane Iron Company. Tuesday evening, Oct. 6, the party will start for Ducktown, Tenn. Wednesday forenoon will be spent in a visit to the mine of the Tennessee Copper Company; in the afternoon the smelting plant of the Ducktown Sulphur, Copper and Iron Company will be visited. On Thursday the sulphuric-acid works of the Tennessee Copper Company, at Copperhill, will be visited.

THURSDAY EVENING SESSION

The evening session, Oct. 1, was opened, with an address of welcome by H. S. Chamberlain, of Chattanooga; President Hammond was in the chair. Mr. Hammond then read his presidential address on "Professional Ethics."

"This is an era of expansion," said Mr. Hammond, "and, conformably with the change in commercial conditions, the function of the mining engineer, as well as that of his confreres in many other professions, has also expanded From his capacity of an engineer, limited to the determination of technical questions, the engineer of today has come to assume an economic importance in those branches of industry dependent upon engineering skill for their development."

Mr. Hammond said that professional duty may be regarded from three points of view: (1) The relation of the engineer's work to employees; (2) its relation to the investing public; and (3) its relation to the individual interests of the engineer. These relations and the proper course to be pursued under different conditions were entered into at length.

In closing Mr. Hammond said: "I am fully aware that these desultory remarks have covered but a small part of the field of professional ethics, even in the single branch of the professions represented by the Institute. But I am not offering a code, nor even an official and representative declaration of principles. My remarks are intended, and will, I hope, be accepted, simply as a contribution to that discussion of their theme in which every engineer of experience may participate."

Doctor Raymond announced the deaths of John Wilkes, of North Carolina, and James D. Hague, who for 30 years was president of the North Star Gold Mining Company, of Grass Valley, Cal. Biographical notices will appear in the *Transactions*.

FRIDAY MORNING SESSION

The morning session, Oct. 2, opened with President Hammond in the chair. T. H. Aldrich, Jr., of Birmingham, Ala., reviewed his paper on "The Treatment of the Gold Ores of Hog Mountain, Alabama." Mr. Aldrich, in speaking of the advantages and disadvantages of southern gold mining, mentioned the favorable climate and the low cost of fuel and labor, and said a $4 gold ore in the South would net greater profits than an $8 gold ore in the Rocky mountains. The Appalachian goldfields have been greatly eroded and the upper portions of the veins have disappeared; in general, the veins have been eroded so deeply that present work is being done in the lower portions. The southern gold ores are abundant, but uniformly low grade. The surface ore cannot be concentrated for the reason that it floats. The gold is extremely fine but is not what is known as float gold. Mr. Aldrich exhibited a number of slides by which the porous nature of the gold (this causing it to float) was shown. Another important feature brought out was the presence of a film, or skin, of iron sulphide which in some cases almost enveloped the gold.

P. A. Maignen complimented Mr. Aldrich on his success with southern gold ores and gave his impressions of a visit to several Colorado gold mills.

In answer to a question by Doctor Raymond, Mr. Aldrich said that all of his milling work is done at or near the boiling point. It had been his experience that dead roasting ores was detrimental.

Edward B. Cook discussed the more important parts of his paper on "Experiences with the Gayley Dry Blast at the Warwick Furnaces." He described the effect and efficiency of the dry blast on the different furnaces. Through the use of the Gayley dry blast a saving of 400 lb. of fuel per day is made, and 350 tons per week more iron is produced notwithstanding the use of a more refractory ore mixture.

Doctor Raymond called on Edgar S. Cook, who made some interesting remarks on the subject. J. E. Johnson, Jr., discussed the use of dry blast and the difference between summer and winter work of blast furnaces. In answer to a question by E. W. Parker as to whether he had ever made any determinations of the moisture in his coke, Mr. Johnson stated that he had found that this was a matter of no importance. John B. Miles stated that the cost of refrigeration can and will be brought down, and that other charges now contemplated would further reduce the cost of dry blast.

After some further discussion on this subject, Doctor Raymond reviewed his paper on "Mr. Gayley's Invention." giving some interesting reminiscences of Mr. Gayley's early work on his invention, his attempts to prove its efficiency by a trial, and his first success.

Owing to the lateness of the hour, John B. Miles was enabled to take up only one or two of the important features of his paper on "The Relation to Slow Driving to Fuel Economy in Iron Blast-furnace Practice." Mr. Miles presented and discussed the records of operation of 11 furnaces, and said that, with the data in hand it is not possible to develop a rule for the most economical rate of driving with relation to fuel, for high- or low-silicon irons, but it appears that for either kind of iron, a blast less than 4 lb. is desirable, and it seems probable that a rate as low as 3 lb. may prove still more economical, so far as fuel is concerned.

FRIDAY EVENING SESSION

At this session, on Oct. 2, Charles Butts presented his paper on "The Geology of the Alabama Coal Measures;" some interesting stereopticon views were used in connection with the reading of this paper. Mr. Butts stated that the major topographical features of the area under discussion are the broad anticlinal valleys known as Birmingham valley; Red mountain and Enon ridge in the midst of the valley; Shades mountain, which bounds the valley on the east; and Sand mountain bounds the valley on the west. The general level is 500 to 600 ft. above the sea. The altitude of the ridges mentioned reaches 1150 feet.

Mr. Butts then took up the stratigraphy of the different fields, showed sections of the different beds, and gave the analyses of the coals, closing with a discussion of the mining and preparation of the coal.

Ernest F. Burchard reviewed his paper on "Clinton Iron Ores in the Birmingham district, Alabama." Mr. Burchard said that the Clinton formation in Alabama consists principally of sandstone, shale and beds of hematite. The beds of hematite, where unweathered, are calcareous, ranging from a calcareous, richly ferruginous sandstone to a ferruginous, silicious limestone. The distinguishing feature of the formation is the relatively large quantity of iron oxide disseminated throughout all the sediments, either in the ferric or the ferrous state. Mr. Burchard went into the character, general distribution and probable origin of the ores, and presented a provisional estimate of the ore reserve. Stereopticon views were used freely.

SATURDAY MORNING SESSION

The morning session, Oct. 3, was called to order at 10 a.m. with President Hammond in the chair. The paper on "Monazite in the Carolinas," by Joseph Hyde

Pratt and Douglas B. Sterrett, was reviewed by Mr. Pratt. "Monazite," said Mr. Pratt, "is used in the manufacture of incandescent mantles, and there are about 40,000,000 of these mantles in use in the United States. In North and South Carolina monazite is obtained from placer, or gravel, deposits. It is also found in the gneissic rocks, which contain from 0.1 to 0.5 per cent. monazite. Unsuccesstul attempts have been made to mine the rock." Mr. Pratt states that in working the gravel, everything is concentrated from the grass roots down. Tailings are rewashed about once every two years to obtain any mineral which might have been deposited by the water from the hills. With the introduction of magnetic separation, the sands yield from 98 to 99.5 per cent. monazite. The machines used are the Wetherill, which are especially adapted to this work. The first magnet, wound at 1.5 amp., takes out magnetite, ilmentite and chromite; the second, 2.5 amp., takes out the garnet, and hornblende, if present; the third magnet takes out the monazite; pyrite and zircon are found in the tailings.

Replying to a question by Dr. Raymond, Mr. Pratt stated that commercial monozite is found in small grains, although he had seen some large crystals.

J. J. Rutledge discussed the principal features of his paper on "The Clinton Iron Ore Deposits of Stone Valley, Huntington County, Penn." Mr. Rutledge stated that the Clinton rocks in Stone valley comprise (1) thick layers of deep-red shale; (2) layers of reddish-gray shale interspersed with beds of sandstone and thin beds of extremely fossiliferous limestone, and (3) yellowish-gray shales alternating with thin layers of olive-colored shales. After going into his work in this field, and setting forth the beliefs of others as to the origin of the ores, Mr. Rutledge stated that his conclusions were that but a very small part of the iron content found in the present ore-bed was deposited in it when the bed was laid down. The small amount of iron is represented by the iron content of the silicious concretions. The subject of the origin of these ores was discussed by several members. Doctor Raymond gave an interesting account of his experiences with the ores of this district.

H. Foster Bain presented a paper on "Studies of Illinois Coals." Mr. Bain made a few remarks on the subject, stating that power is now being generated in Illinois as cheaply as at Niagara Falls, and is being transmitted 200 miles. The actual margin of profit in coal mining is only from 5 to 10c. per ton, owing to the many difficulties which beset the operator.

The session was closed with the presentation of a paper on "Investigations on Jigging," by Royal P. Jarvis. On account of the lateness of the hour, Mr. Jarvis made only a few remarks, explaining some of the tests set forth in his paper.

Mine Accidents Due to Electricity

The following letter has been addressed to a number of the larger companies operating electrically equipped bituminous coal mines. It is desired to extend this invitation to all those interested in the subject, and communications in this line with the purposes indicated in this letter will be welcomed by the Geological Survey:

"GENTLEMEN—In connection with the investigation of mine accidents, undertaken by the Geological Survey, it is desired to have the coöperation and assistance of both operators and miners, that the tests made shall have practical ends in view, and that disputed points may be cleared up, so far as possible. With especial reference to the electrical investigations which will be made, it is requested that your superintendents, mine foremen, electricians, machine bosses, and others interested prepare memoranda of tests desired, these tests to determine liability of ignition through electrical means of mine gas, coal dust, mine timbers, or coal. Problems referring to electrical shock, insulation as regards protection, etc., are also invited.

"Facilities are being provided for testing motors, lamps, fuses, etc., and for experiments with arcs from line to ground or between lines, at 100 to 600 volts d.c., and from 100 to 2200 volts a.c.

"It is requested further that such suggestions be forwarded through your superintendents or main office, so that the records may be simplified. Correspondence should be addressed to U. S. Geological Survey, Geo. R. Wood, consulting electrical engineer."

Deterrents in Cyanidation

Duncan Simpson draws attention to the fact that oil and lime act as deterrents to the dissolution of free gold by cyanide solution.[1] In a pronounced case of low extraction on the Witwatersrand, when the sand containing 29 grains of gold per ton was no longer amenable to cyanide treatment, it was found possible by laboratory treatment to reduce this residual gold by further cyaniding to 13 grains per ton. It was found that both oil and lime were present. The sample containing 29 grains to the ton was washed several times with water in order to insure the absence of dissolved gold. One portion *a* was repeatedly washed with ether, and another portion *b* with dilute hydrochloric acid. By evaporating the washings from *a* a substance was recovered which resembled vaseline in appearance. "Touch-lime" was found in the washings from *b*.

Further treatment with cyanide solution now reduced *a* to 15 to 17 grains per ton, but *b* to only 27 grains per ton. On treating, after thorough washing, *a* with dilute hydrochloric acid, and *b* with ether, and again adding cyanide solution (0.25 per cent. KCy), both were reduced to 12 to 13 grains per ton. The oil film had resisted removal by the working cyanide solution of from 0.15 per cent. to 0.05 per cent. of K Cy, during the treatment period of about six days.

Prolonged aëration by circulation in sumps was found to be effective in preventing the precipitation of carbonate of lime to any excessive amount in the leaching tanks. The further leakage of bearing-oil into the cyanide tanks was stopped by a threat of dismissal for the mill hands on its repetition.

[1]Bulletin No. 41, Inst. Min. and Met.

An Interesting Hoisting Record

The Superior Coal Company, of Gillespie, Ill., under the management of J. W. Miller, operates three shaft mines. None of these mines has been in operation more than four years and yet each makes a daily output of over 3000 tons. Two days' work at each mine recently gave the following results:

No. 1 Aug. 24, 3270 tons.	No. 2 Aug. 26, 3015 tons.
No. 1 Aug. 25, 3276 tons.	No. 3 Aug. 25, 3601 tons.
No. 2 Aug. 25, 3019 tons.	No. 3 Aug. 26, 3619 tons.

The total for the three mines, two days' work at each, was 19,800 tons. This is an average of 3300 tons per day of eight hours for each mine.

Each of these mines is about 350 ft. deep and is equipped with 24x36 in. first-motion hoisting engines with cylindrical drums 7 ft. in diameter, built by the Litchfield Foundry and Machine Company, of Litchfield, Illinois.

Rhodesian Mines

The gold production of Rhodesia in August was 52,482 oz. fine, being 1755 oz. less than in July. For the eight months ended Aug. 31, the total was 406,027 oz. fine, or $8,392,578. For the eight months in 1907 the total was 400,604 oz.; but the reports last year were made in bullion, while this year they are in fine gold.

Other production reported this year in August was 27,744 oz. silver, 111 tons lead, 9 tons copper, 554 tons chrome ore and 14 tons wolframite. Coal mined was 14,125 tons.

British Guiana Production

Gold exports from British Guiana for the eight months ended Aug. 31 were 43,580 oz. bullion in 1907, and 42,163 oz. in 1908; a decrease of 1417 oz. The bullion reported this year was equal to $746,862, or 36,133 oz. fine gold. Exports of diamonds for the eight months were 2670 carats, valued at $20,313; an increase of 1106 carats and $7942 over last year.

THE ENGINEERING AND MINING JOURNAL
Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. and Treas. ROBERT MCKEAN, Sec'y.
505 Pearl St., New York.
London Office: 6 Bouverie Street, London, E. C., Eng.
CABLE ADDRESS "ENGMINJOUR, N. Y."

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines. $6.50 in Canada.

To foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

For sale by all newsdealers generally.

Entered at New York Post Office as mail matter of the second class.

CIRCULATION STATEMENT

During 1907 *we printed and circulated* 507,500 *copies of* THE ENGINEERING AND MINING JOURNAL.

Our circulation for September, 1908, *was* 40,800 *copies.*

October 3..... 13,000
October 10..... 9,800

None sent free regularly, no back numbers. Figures are live, net circulation.

Contents

PAGE

Editorials:
The Copper Deposits of Katanga 727
Misleading Estimates 727
Iron Production in "Hard" Times 728
The Mining Laws of Oklahoma 728
The Orphan Copper Company 728
*Dredging for Platinum in the Urals, Russia. *L. Tovey* 701
Metallic Mineral Resources of the Philippines ..... *Maurice Gooaman* 706
A California Pipe Line. *Special Correspondence* 707
Slime Deposition and Agglomeration 707
*The Anaconda Protective Hood. *Robert N. Bell* 708
The Value of Galena and Blende in Wales .. 709
Accumulation of Gold on Copper Plates 709
*Dumping Waste with a Locomotive Train. *Arthur B. Foote* 711
The Geology of Cobalt. *Special Correspondence* 711
The Broken Hill South Silver Mining Company 712
*Sinking a Winze with Long Holes. *George C. McFarlane* 713
*Electrical Equipment of the Butte-Balaklava Mine ..... *A. Floyd Bushnell* 714
Commerce Between the United States and Germany 714
Underground Conveyers at the Kleinfontein Mine ..... *Edward J. Way* 715
*McFarlane Hydraulic Air Compressor 716
Treating Concentrates at Bellevue Limited Mine, W. A 716
Professional Ethics .... *John Hays Hammond* 717
Lehigh Valley Coal Company 719
The Nature of the Volatile Matter in Coal. *Horace C. Porter and F. K. Ovitz* 720
*The Mine Telephone and Its Advantages. *Special Correspondence* 722
Coal Trade and Mining Conditions in Indiana 723
The Education of Coal Miners 728
Colliery Notes 724
The Meeting of the American Institute of Mining Engineers. *Editorial Correspondence* 725
Mine Accidents Due to Electricity 726
Deterrents in Cyanidation 726
An Interesting Hoisting Record 726
Rhodesian Mines 726
British Guiana Production 726
Correspondence:
The Colliery Law of Oklahoma. *N. H. Rowland* 729
Alumina in Slags ..... *Walter E. Koch* 730
Grecian Magnesite ..... *F. Meijnan* 730
The San Rafael Mill ..... *Mark R. Lamb* 730
New Zealand Mines 730
Mineral Production of California in 1907 731
New Publications 732
Questions and Answers 733
Personals, Obituaries, Societies and Technical Schools 734
Special Correspondence 735
Mining News 737
Markets, etc 742
*Illustrated.

The Copper Deposits of Katanga

After several reports that the Rhodesian railway was to be extended from Broken Hill into the southeastern part of Katanga, which have proved to be incorrect, a realization of this development now appears to be in sight. According to a recent press despatch, the British South Africa Company, which is building the Cape-to-Cairo railroad, has agreed to extend the line from Broken Hill to Mabaya on the frontier of the Congo. From that point the railroad company of the Lower Congo and Katanga agrees to extend the line to the Star of the Congo mine, 60 miles, and then onward through Kambove to the Ruwe copper district, 170 miles further.

The delay, heretofore, has been due to sparring between the mining company and the railway company. The mining company is engaged in building the Benguella railway, inland from the west coast of Africa, a distance of upward of 1000 miles. The Rhodesian railway is much nearer to the mines and its extension is the natural way to bring out their produce most quickly, the intervening country being extremely easy for railway construction. However, the railway company has anticipated that if it furnished this outlet for the mines, the mining company would be able more quickly to obtain the funds to complete its own railway, which would then deprive the Rhodesian railway of the business. Consequently, the Rhodesian railway demanded of the mining company a contract for a long term of years.

This developed an interesting situation. The mining company is already engaged in smelting on a small, indeed scarcely more than experimental, scale, but is producing several tons of copper per day and already has four or five hundred tons of the metal piled up. It is impossible to ship this copper to market. The first thought is that transportation by ox-teams to Broken Hill, a matter of two or three hundred miles, would be no serious undertaking, but unfortunately a tsetse-fly region intervenes, wherefore draft animals cannot be used. Wagon transportation to the Atlantic coast is out of the question, the distance being so great that a year is the time for a round trip.

No doubt, the Rhodesian railway company has been all along desirous of building into Katanga, where it will surely obtain business of consequence in spite of the later advent of the Benguella railway, and has been simply bluffing in order to exact the best possible terms. What the latter are to be has not been announced. The thing that is chiefly of interest to the world in general is this: If the extension of the Rhodesian railway is really to be built, and the work is prosecuted with ordinary diligence, the mines of Katanga ought to be able to begin shipping copper on a small scale inside of the next 12 months.

Misleading Estimates

The arguments of the National Conservation Commission would be improved if it ceased from publishing thoughtless statements, which magnify the waste of our natural resources. For example, in a recent circular letter it cites a report by the Geological Survey, to the effect that there is about 2,800,000 horsepower, more or less, available from the rivers rising in the southern Appalachian mountains, half of which, at least, could be utilized for power. Taking a minimum of 1,400,000 horsepower, it is figured that its rental at $20 per horsepower per year would amount to an annual return of $28,000,000. It is further stated that "water power is much cheaper than fuel power and will become more and more so as the available supply of fuel is depleted."

These bald statements convey the idea that something worth $28,000,000 per annum is being deliberately allowed to go to waste. We suggest that if the scientists responsible for them take the trouble to secure engineering estimates as to the cost of developing this water power they will find that the net annual value is less than $28,000,000. It is an old fallacy that water power does not cost anything, or at least not much worth speaking of, Sometimes water power can be developed cheaply; at other times the development is costly. Water power is not always cheaper than fuel power.

Incidentally, it may be inquired under what guise of legality the Geological Survey spends its money upon the investigation of engineering problems like the development of water power, when the mining industry is loudly demanding its attention to important problems of economic geology, which concern directly the work of prospecting for mineral deposits. The true function of the Geological Survey

is to study the mineral resources of the nation. During recent years a great amount of its time and money has been expended upon the water resources. True, water is, according to Dana and other mineralogists, a mineral, which like mercury occurs commonly in liquid form. Its melting point is 32 deg. F., below which it exists in nature as ice. The annual harvesting of the great crop of ice to supply our cities is a branch of the mineral industry that appears to have escaped the Geological Survey, but unless Doctor Smith confines his staff to the proper field, we shall probably see experts of the Geological Survey on the banks of the Hudson river before long.

Iron Production in "Hard" Times

The general statements received as to the amount of business in the iron and steel trades are probably less discouraging than they appear on their face. We are told that plants are running to 60 or 65 per cent. of "normal," or of "capacity," for instance. But the assumed normal operation is the business done at the hight of the boom of 1906 and 1907, which very far exceeded anything on record. If the capacity is taken as the standard, it includes the great additions to plants made during the period of extraordinary activity. On either basis a level is established which is far above anything known in previous years.

It is not intended to deny the existence of depression, or to say that the fall in production has not been serious, as compared with 1907 and 1906; but the fact remains that there is still a large business being done, and the country is absorbing iron and steel products in large quantities. Thus the production of pig iron—the base of all the iron industries—in the first half of 1908 was only 6,918,004 tons, a decrease of 6,560,040 tons, or 48.7 per cent., from the first half of 1907. The second half of the year will probably show a considerable gain over the first half; but even if it should not do so, and only duplicate the first half, the total for the year would be 14,000,000 tons, which is greater than that of any year prior to 1901. In fact there was no year up to 1900 in which the production of so great a quantity of iron would have been possible. That the capacity for making iron had been doubled in seven years was an indication that production had increased in greater ratio than the ability of the country to absorb it—which is the real normal level of production. Under the stress of speculation and extended credit that point may be exceeded for a year or two, but only to be followed by a more or less disastrous reaction.

The point is that even in these present hard times the country is using and absorbing large quantities of iron and steel—far larger than would have been believed possible 20 or even 15 years ago. Moreover, present production is really absorbed, for it has been brought down to the actual level of demand, and there has been no material accumulation of unsold stocks since the beginning of the year.

The Mining Laws of Oklahoma

The State of Oklahoma, in adopting its constitution, took a radical course in many respects, as is well known. These measures were intended to preserve the rights of the people, which is commendable and proper, providing that the legitimate rights of some are not unfairly injured at the same time. Unfortunately, the latter appears to be the case in connection with some of the Oklahoma proscriptions.

For example, it was forbidden that natural gas should be piped out of the State. In the State there is not at present any great market for gas, and the present inability of persons owning gas property to realize full advantage from it deprives them of a certain value. In certain cases the persons owning natural gas rights in Oklahoma had laid their pipes across the line before Oklahoma became a State and conveyed gas through them. We do not believe that the State can prevent them from continuing to do so.

A correspondent, connected with one of the important coal-mining companies of Oklahoma, elsewhere in this issue of the JOURNAL, calls attention to the troubles that are being entailed by the colliery law of the State. This law, which appears to have been drafted without careful consideration, involves the practical remodeling of many coal-mining operations. The State certainly has the right, under its police powers, to prescribe measures insuring the safety of men working in mines, but certainly it does not possess the right to compel unnecessary, or even ridiculous measures, such as the provision of *safe and convenient stairs* in an escape shaft.

Some of the laws of Oklahoma appear to be distinctly of an *ex post facto* character, and we have no doubt that their constitutionality will be tested in the courts.

The Orphan Copper Company

Some good securities are dealt in on the "curb;" also some that are not good. Trading on the "curb" is free; there is no listing, or passing upon any stock by a committee. Consequently, there are practically unlimited opportunities for the setting of snares for the unwary.

An illuminating example of such methods has been afforded by the recent transactions in the stock of the Orphan Copper Company. This company was offered to public subscription last June at $2.50 per share, the capital stock being 600,000 shares, of which 100,000 were offered. At that time the mine was confessedly undeveloped, i.e., no considerable bodies of ore had been blocked out.

Since then the stock of the company has been a prominent feature in the quotations of the "curb" market and ostensibly rather large transactions were made in its shares. In the meanwhile, Cardenio F. King, of Boston, who is at present under indictment on several charges of larceny, secured a block of the company's stock and has been offering it to the gullible public through the medium of his "financial bulletin."

Advices from Globe, Arizona, have not heralded any developments of importance in the mine; indeed the company has been conspicuously silent in that respect. Nevertheless, the stock of the company was boosted up to $8\frac{3}{8}$, representing a valuation of about $5,000,000 for the mine, which is pretty good for a property that last June was expected to be able at the end of four to six months' development to produce 50 tons per day of ore yielding 50 lb. of copper per ton. Last week the stock of the company fell about four points in a single day.

The affair is so transparent that no particular comment seems to be worth while. It is a pity that there cannot be some organization of the "curb" market that can exercise a supervision over the dealings that take place. The standing of the substantial companies is discredited among those who are unable to discriminate by the barefaced manipulation of stocks which have not full value behind them.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice and Debatable Points Suggested by Articles in the Journal

CORRESPONDENCE AND DISCUSSION

The Colliery Law of Oklahoma

The Territory of Oklahoma and the Indian Territory, before same were combined and the State of Oklahoma formed, had been operating coal for many years in the mining districts, which are now known as districts Nos. 1, 2 and 3. The former comprises the counties of McCurtain, Le Flore, Latimer, Pushmataha, Choctaw, Coal, Atoka, Bryan, Pontotoc, Johnson, Marshall, Garvin, Murray, Carter, Love, McClain, Grady, Stephens, Jefferson, Comanche, Caddo, Washita, Kiowa, Tillman, Jackson, Greer, and Beckham. Mining district No. 2 is comprised of Pittsburg, Hughes, Seminole, Pottawatomie, Lincoln, Payne, Logan, Oklahoma, Cleveland, Canadian, Kingfisher, Garfield, Grant, Alfalfa, Woods, Major, Blaine, Custer, Dewey, Woodward, Ellis, Roger, Mills, Beaver, Texas, Cimmaron, and Harper, while the third district is composed of counties Sequoyah, Adair, Delaware, Ottawa, Craig, Mayes, Cherokee, Haskell, McIntosh, Muskogee, Wagoner, Nowata, Washington, Rogers, Tulsa, Okmulgee, Creek, Pawnee, Noble, Kay, Osage, and Okfuskee.

Until Senate Bill No. 26, by Senator W. N. Redwine, prescribing the mining laws of 1908 for the State of Oklahoma came into force on April 6, 1908, which declared the act of Congress entitled, "An Act for the protection of the lives of Miners in Territories," approved March 3, 1891, and the act of Congress entitled, "An Act to amend an Act entitled 'An Act for the protection of the lives of Miners in Territories,'" approved July 1, 1902, and extended over the State of Oklahoma by Section 13 of the constitution of the State of Oklahoma to be no longer in force in the State, mining operations had been carried on with little restrictions.

It is by no means an easy proposition to remodel a coal mine in five minutes, or one whose workings are by any means extensive in five months, and it seems to me that as a whole the new mining laws, as prescribed by the above bill, are of a most stringent nature, and in order to comply with same, it will be an endless expense to the operators of the State of Oklahoma. The larger concerns operating in the State are suffering considerably, and it seems to me that the small operator will be doomed entirely, unless some modifications are made, or the laws declared unconstitutional.

Section V, Article III, of the State Mining law, says: "When any mine is operated by a shaft which exceeds 75 ft. in vertical depth, the persons employed in the said mine shall be lowered into and raised from said mine by means of machinery, and where the employed are lowered into and hoisted from the mines at the main-shaft opening, the other shaft shall be supplied with safe and suitable machinery for hoisting and lowering persons, or with safe and convenient stairs for use in cases of emergency by persons employed in the said mine," etc.

The company with which I am connected contemplated sinking a circular concrete-lined shaft at one of their mines as an additional air and escape shaft. At this particular mine, whose workings are extensive, there were already two shafts sunk, which complied with this clause of the act. The new shaft was to be sunk purely and simply for additional safety and improved ventilation, and the proposition was to include perpendicular alternating iron ladders with platforms every 10 ft. 6 in., so that a person could not by any means fall further than this depth. The total depth of the shaft was a little over 300 ft. The chief mine inspector was communicated with for his approval to the proposition, which he declined to give, and referred to the section above mentioned of the State mining laws. The result is that now there will be no additional escapeway constructed in connection with this new air shaft, and the only means of escape in emergency cases will be as hitherto. I am quite at a loss to know where the advantage is to be derived regarding the safety of the miners in not allowing such a proposition to be carried through.

Section I, Article V, provides that "the operator of every coal or other mine, whether shaft, slope, or drift, shall provide and hereafter maintain ample means of ventilation affording not less than 150 cu.ft. of air per minute for each and every person employed therein, and 750 cu.ft. of air per minute for every animal employed therein; but in a mine where firedamp has been detected, the minimum shall be 200 cu.ft. per minute for each person employed therein and as much more in either case as one or more of the mine inspectors may deem requisite," etc.

This seems to me to be an exorbitant amount of air as required by other States, and I do not believe that one-tenth of the mines operating throughout the entire State had the requisite amount of air circulating through their workings when the new mining laws came into force on April 6, 1908; nor in most cases were the fans then employed, even when speeded to their utmost capacity, able to produce the required quantity. It therefore necessitated the adoption of larger or additional ventilating machinery to be installed, which was an increased cost to the operator.

Section II, Article V, provides that "not more than 45 persons shall be permitted to work in the same air current, and mines where 10 or more persons are employed shall be provided with a fan or other artificial means to produce ventilation, but no furnace shall be used where mines generate gases in dangerous quantities, and all stoppings between main intake and return airways hereafter built or replaced shall be substantially built of suitable masonry or concrete," etc.

I am personally acquainted with several mines, at which operations, while they had considerably more than the requisite quantity of air per person and animal amployed therein, had more than the stipulated number of persons working in the same air current, but as this was not permissible according to the law, it necessitated the construction of overcasts and additional splits, which meant additional expense to the operator, and little, if any, advantage to be gained, as the mines I have reference to are perhaps the best ventilated mines in the State.

Section V, Article VI, states: "All electric pumps inside of the mines shall receive careful attention while in use at a permanent pumping station; such pumps shall be placed in a fireproof shed, constructed of masonry walls."

If electrical pumping apparatus has previously been installed and adequate pump houses or sheds are already constructed, of suitable material other than masonry, and have been located permanently for years without accident, this clause means that the present pumping stations shall be torn out and replaced by masonry. One can readily see the advantage of masonry over any combustible material, but does such a change justify this additional expense? It might have been advisable to have stated that all pumping stations to be *hereafter* erected should comply with the new law.

Section IV, Article VII, states: "In all haulage roads, on which hauling is done by animal power and whereon men have to pass to and from their work, holes for shelter, which shall be kept clear of obstruction, shall be made at least every

30 yd. and be kept whitewashed, but shelter holes shall not be required in entries from which rooms are driven at regular intervals not exceeding 50 ft., where there is a space of 4 ft. between car and rib. But in no case shall men be permitted to travel to and from their work on haulage-roads where hauling is done by machinery, and where such hauling is done, there shall be a manway provided for men to travel to and from their work. Said manway shall be 6 ft. in width and 5 ft. in hight, and shall be kept clear of all obstructions, and shall be properly timbered."

In many mines in the State of Oklahoma hauling is done both on slopes and entries by machinery, and such slopes and entries have also been used as traveling-ways for the employees.

The air courses in many cases are gobbed up tight, and the ventilation is principally conducted through rooms to the outlet. In order to comply with this law, then, it was necessary to clean up air courses, in some cases 2000 ft. in length, in order to provide a separate traveling-way for the miners. Up to the present time the miners have traveled these entries or slopes, as the case may be, to their respective working places, and the machinery has not been set in motion until they have got clear of the haulage-roads. It can easily be gathered what an enormous expense this will entail on the operators of this State in order to comply with this section, and it seems to me in a good many cases to be an absolutely needless and unjustifiable clause.

Section IV, Article XII, states: "No person other than the shot firers shall tamp any hole," etc. It was the custom previously for persons other than shot firers to tamp holes.

Section VI, Article XII, provides that "It shall be unlawful for any shot firer or shot firers to light the shots in more than one working place at any one time in any one split of air." It was the custom previously for shot firers to light the shots in more than one place at any one time in any one split of air.

N. H. Rowland.

Hartshorne, Okla., Sept. 19, 1908.

Alumina in Slags

The discussion on alumina in slags has rather astonished me. I have lecture notes in chemistry and metallurgy, made in the early seventies, wherein I find that I was taught by very eminent professors in England, France and Germany that at certain temperatures, Al_2O_3 is always an acid in silicates and slags fairly low in silica, and Fe_2O_3 behaves in a similar manner. Have we all forgotten the experiments of Sefström, on combinations of silica, alumina and lime, and his remarks on the effect of temperature? "Those who run may read," but maybe we run too fast to read nowadays. There was a lot of good work done in this line about 1830, nor is it out of date yet. I remember, however, being laughed at, once, when talking about ferrate of lime in the early days of the basic-steel process.

As far as my teaching and observation go, the acid properties of Al_2O_3 and Fe_2O_3 are simply a question of temperature. If you study the periodic tables of Mendeléeff, and the work of Lothar Meyer and others, you will see clearly in the case of Al_2O_3 that it must have acid properties at high temperatures. In Mendeléff's typical period No. 2, Al stands between Mg and Si; the series being Ne, Na, Mg, Al, Si, P, S, Cl. Na is a strong base, Mg is a base; Al being the third in the series, one would naturally expect it to have properties approaching those of Si, coming next; and as Si is noted for strong acid properties at high temperatures, one would naturally expect a foreshadowing of those properties in Al. There are other reasons, but it would take too long to go into them all. Science is always a long way ahead of practice.

Mr. Bretherton, being a "hot-blast" man, like myself, does not dread alumina as the "cold-blast" man does, or rather did; for Mr. Sticht has proved that by raising the blast pressure to 3 or 4 lb., he gets as good a result as by heating the blast; that simply means more oxygen and greater heat and chemical activity at the tuyeres. Mr. Sticht's brochure on "Pyritic Smelting" (in German) should be studied by every copper smelter. It seems to me that in ordinary low-pressure cold-blast copper smelting, the temperature is seldom high enough for alumina to act as an acid, and so it has got a bad name through ignorance of conditions. I live in hope that someone in a position to make the needful experiments may do so, and tell us definitely the critical temperature of alumina, and help us to put copper smelting on a scientific basis of fact instead of the present slough of conjecture.

Moissan, Ostwald and others in France and Germany have published papers of great value to metallurgists, and as every educated man now reads French and German, or falls astern, there is no need for translations. It seems to me that "mass action" must play a very important part in the formation of slags, but I do not know that any work has been done along this line. Although I know too well that experiment is frowned upon here, still I believe the cents expended would come back in dollars; it was certainly so in the case of the late Sir William Siemens. Under his direction I spent thousands of pounds in pure experiments in the early days of open-hearth steel, and some of them still crop up as new methods, but men of his type are extremely rare, more's the pity.

Walter E. Koch.

El Paso, Texas, Sept. 21, 1908.

Grecian Magnesite

In the Journal of Aug. 29 I read your answer to an inquiry by T. B. with regard to "Magnesite in the United States," being interested especially in the magnesite produced in Greece. Permit me to state that your figures are not altogether correct. The analysis given by you must be of magnesite of Hungarian origin. Grecian magnesite contains much higher proportions of magnesia—MgO—and of carbonic acid—CO_2—as the inclosed analysis of the average product of our mines shows. This analysis was of raw magnesite from the Pyli mines, and was made on a sample dried at 212 deg. F., at which temperature it lost 0.87 per cent. moisture. It is as follows:

ANALYSIS OF MAGNESITE FROM PYLI.

Magnesia	46.28 per cent
Lime	0.41 " "
Ferric oxide	0.03 " "
Alumina	0.07 " "
Silica	2.27 " "
Carbonic acid	49.85 " "
Sulphuric acid	0.02 " "
Phosphoric acid	trace
Combined water	1.15 " "
Total	100.08 " "
Equivalent to magnesium carbonate	96.74 " "

The price you mention is also too low. It may be considered now as $6.50 per ton for crude and $22 for calcined.

F. Meijnan,
Société Hellenique de Mines de Magnesite.

Amsterdam, Holland, Sept. 15, 1908.

The San Rafael Mill

In my description of the San Rafael mill at Pachuca, Mexico, published in the Journal of Aug. 15, page 325, I mentioned a scraping classifier and a continuous slime settler of the Dorr type. Although at first it was not planned to use Mr. Dorr's machinery, since I wrote, his machines have been purchased, and inasmuch as his name was mentioned in my article, it seems no more than just to make this correction.

Mark R. Lamb.

Mexico, D. F., Sept. 21, 1908.

New Zealand Mines

Gold exports from New Zealand in June were 47,416 oz. bullion, an increase of 20,714 oz. over June of last year. For the half-year ended June 30 the total exports were 226,870 oz. bullion in 1907 and 254,815 oz. in 1908; an increase of 27,945 oz. The bullion reported this year was equal to $4,905,460, or 237,323 oz. fine gold.

Silver exports in June were 175,549 oz., an increase of 84,318 oz. over June, 1907. The greater part of this silver comes from the gold mines of the Ohinemuri district.

Mineral Production of California in 1907

State Mineralogist Lewis E. Aubury has placed in the hands of the State printer a complete report of the mineral production of California, by counties, in the year 1907. The total mineral output of California last year is announced to have been $55,697,949, or a gain in total value of $8,921,864 as compared with the grand total for 1906. Production by substances and by values is reported by the producers to have been as follows:

Asbestos	70 tons	$ 3,500
Asphalt	79,718 "	1,058,400
Bituminous rock.	24,122 "	72,835
Borax	106,825,000 lb.	1,200,913
Cement	1,613,563 bbl.	2,585,577
Chrome	302 tons	6,040
Clay (brick)	362,167 M.	3,438,951
Clay (pottery)	160,385 tons	254,454
Coal	23,734 "	55,849
Copper	32,602,945 lb.	6,341,387
Fuller's earth	100 tons	1,000
Gems	.....	232,642
Gold	809,213.52 oz.	16,727,928
Granite	399,431 cu.ft.	373,376
Gypsum	8,900 tons	57,700
Infusorial earth.	2,531 "	28,948
Iron ore	400 "	400
Lead	164 "	16,690
Lime	684,218 bbl.	756,376
Limestone	230,985 tons	406,041
Macadam	1,544,617 "	1,082,302
Magnesite	6,405 "	57,720
Manganese	1 "	25
Marble	37,512 cu.ft.	118,066
Mineral paint	250 tons	1,720
Mineral water	2,924,269 gal.	544,016
Natural gas	169,991 cu.ft.	114,759
Paving blocks	4,604 M.	199,347
Petroleum	40,311,171 bbl.	16,783,943
Platinum	300.07 oz.	6,255
Pyrites	82,270 tons	251,774
Quartz crystals.	4,000 lb.	10,000
Quicksilver	17,379 flasks	663,178
Rubble	744,271 tons	832,713
Salt	88,063 "	310,967
Sand (glass)	11,065 "	8,178
Sandstone	159,573 cu.ft.	148,148
Serpentine	1,000 "	3,000
Silver	1,138,858 oz.	751,646
Slate	7,000 squares	60,000
Tungsten	.....	120,587
Zinc	.....	10,598
Total		$55,697,949

The feature of the year was the advancement of petroleum to the first place, surpassing gold in the value of output for the first time. The production of gold and silver fell off $2,070,708 in 1907, as compared with the preceding year. Petroleum, owing to the increase in price, was more largely produced.

Metallic substances, including precious metals, represent $24,896,083 in the total for 1907. The production of zinc, which was first reported in 1906, continued in 1907. In metallic substances the figures for 1907, compared with 1906, show a falling off that amounts to $1,206,619. As the decrease in the precious minerals amounted to $2,070,708, the other metallic substances are seen to have been more largely produced than in 1906. The gains are in copper, pyrites, chrome and platinum. As usual, the value of silver is given at the commercial average rating in New York.

Non-metallic substances were produced in 1907 to the value of $2,495,000. Under this heading are included coal, mineral waters, borax, infusorial earth, salt, magnesite, manganese, gypsum, mineral paint, fuller's earth and gems. The production of the non-metallic substances in 1906 was $2,589,984.

The great increase for 1907 was in hydrocarbons and gases. The combined values of these substances was $18,029,937, a gain for the year over the total value for 1906 of $7,859,664. The hydrocarbons are asphalt, bituminous rock and petroleum. There were produced 7,687,171 more barrels of petroleum in 1907 than in 1906. The production of asphalt rose from 77,756 tons to 79,718 tons and the value from $777,560 to $1,058,400.

Structural materials made a record of production for 1907 of $8,011,810, as against $7,859,126 in 1906. The list of California structural materials includes bricks, pottery clays, cement, lime, limestone, rubble, macadam, concrete rock, marble, granite, sandstone, slate, glass sand and serpentine. The largest gain in any branch of the structural materials industries must be credited to the brick and pottery clays, taken together.

The minerals in 1907 took the following order in values: Petroleum, gold, copper, clays and their products, cement, borax, silver. This is the same order as in 1906 with the exception that petroleum succeeds to the first place and gold takes the second place.

Production in the Various Counties

The productions of the several counties are summarized as follows: Placer county produced the asbestos. Asphalt was produced in Alameda, Contra Costa, Kern, Los Angeles, Santa Barbara, San Luis Obispo and San Francisco counties. The bituminous rock all came from Santa Cruz and San Luis Obispo counties. Borax is credited to Inyo, San Bernardino and Ventura counties; cement to Napa, San Bernardino and Solano counties; chrome to Calaveras and Shasta counties. Brick clays were utilized in Alameda, Contra Costa, Fresno, Humboldt, Imperial, Kern, Kings, Los Angeles, Marin, Merced, Madera, Mendocino, Orange, Riverside, Sonoma, Santa Clara, San Joaquin, San Mateo, San Diego, Santa Barbara, San Bernardino, Sacramento, San Francisco, San Luis Obispo, Shasta, Solano, Tehama, Tulare and Ventura counties. Pottery clays are credited to Alameda, Amador, Calaveras, Los Angeles, Placer, Riverside and Sonoma counties. Coal was mined in Alameda, Amador and Monterey counties.

The great bulk of the copper was produced in Shasta county, the copper output of that county alone being more than 27,000,000 lb. Calaveras produced 3,941,883 lb. Fresno stood third in copper production with 250,000 lb. to its credit. The other copper-producing counties in 1906 were Amador, El Dorado, Inyo, Los Angeles, Madera, Nevada, Orange, Riverside, San Diego, San Bernardino and Siskiyou.

Kings county produced fuller's earth. San Diego, Riverside, Sonoma and Tulare counties reported production of gems. The negligence of producers in making reports is responsible for the relatively small showing for gems.

Nevada, Placer, Riverside, Sacramento, San Bernardino and San Diego counties were granite producers, and Colusa, Los Angeles, Santa Barbara, Siskiyou and Yolo the sandstone producers. Some serpentine was quarried in Los Angeles county. Alameda, Colusa, Contra Costa, Los Angeles, Riverside, Sacramento, San Benito, San Bernardino, San Francisco, Santa Cruz, San Luis Obispo, San Mateo, Solano and Sonoma are entitled to credit for the production of macadam. Marble was quarried in Inyo, Los Angeles, Riverside, San Bernardino, San Diego, and Tuolumne counties and rubble in Alameda, Los Angeles, Marin, Napa, Placer, Riverside, San Diego, San Bernardino, Santa Barbara, Sacramento, San Francisco, Solano and Ventura counties. Glass sand was produced in Monterey county; paving blocks in Riverside, San Bernardino, Solano and Sonoma.

The sole producer of iron ore was Shasta county. Santa Barbara was alone in the production of infusorial earth. Kern, Los Angeles and Tulare counties were gypsum producers. Madera, Mariposa, Orange, San Bernardino, Inyo and Riverside were lead-producing counties. The zinc came from Inyo and Orange counties.

Four counties yielded magnesite, i.e., Alameda, Riverside, Sonoma and Tulare counties. Plumas alone produced manganese. Stanislaus is credited with the mineral paint. Mineral waters were produced for market in the counties of Butte, Colusa, Lake, Los Angeles, Mendocino, Monterey, Napa, San Benito, Santa Barbara, San Luis Obispo, Santa Clara, San Diego, Shasta, Sonoma, Sierra, Siskiyou, Solano and Tehama. The natural-gas producers were the counties of Sacramento, San Joaquin, Santa Barbara, Ventura and Solano.

The petroleum-producing counties included Fresno, Kern, Los Angeles, Orange, Santa Clara, San Luis Obispo, Santa Barbara and Ventura. Quicksilver was mined in Colusa, Lake, Napa, Santa Clara, San Benito, Santa Barbara, Solano, San Luis Obispo and Sonoma counties. Pyrites came from Alameda and Shasta counties. Calaveras alone produced quartz crystals.

The counties that reported gold production are Amador, Butte, Calaveras, Colusa, Del Norte, El Dorado, Fresno, Humboldt, Inyo, Kern, Los Angeles, Orange, Ventura, Madera, Mariposa, Merced, Monterey, Mono, Nevada, Placer, Plumas, Riverside, Sacramento, San Bernardino, San Diego, San Luis Obispo, Shasta, Sierra, Siskiyou, Stanislaus, Trinity, Tuolumne and Yuba. Silver was also mined in each of the gold-producing counties with one exception.

New Publications

CYANIDE PROCESSES. Fourth Edition, Revised and Enlarged. By E. B. Wilson. Pp. 249, illustrated. 5x7½ in.; cloth, $1.50. New York, 1908: John Wiley & Sons; London; Chapman & Hall, Ltd.

The appreciation with which this little book has been received is manifested by the fact that a fourth edition has been required. Since the first appearance of the work the art of cyaniding has developed marvelously. The present edition of Professor Wilson's book has been brought well up to date, discussing such recent developments as the vacuum and pressure filters, the Adair-Usher slime process, etc.

THE GEOLOGY AND ORE DEPOSITS OF THE COEUR D'ALENE DISTRICT, IDAHO. By Frederick Leslie Ransome and Frank Cathcart Calkins. Professional Paper No. 62, U. S. Geological Survey. Pp. 203, illustrated. 9x11½ in.; paper. Washington, 1908: Government Printing Office.

This is the full report of the study of the ore deposits of the Cœur d'Alene, which previously has been published in the form of a bulletin. It is one of the elaborate contributions of the U. S. Geological Survey, and pertaining to one of the most important of American mining districts, it is of supreme interest. The value of the report is enhanced moreover, by the fact that the district of which it treats is still a live one.

THE DESIGN AND EQUIPMENT OF SMALL CHEMICAL LABORATORIES. By Richard K. Meade. Pp. 138, illustrated. 6x9¼ in.; cloth, $2. Chicago, 1908: The Chemical Engineer Publishing Company.

Contents: General features. Hoods. Sinks and water supply. Desks. Table and apparatus for rapid filtrations, etc. Ignition table and apparatus for ignitions. Table and apparatus for filtrations. Balance support, balance and accessories. Heating appliances. Preparation of distilled water. Apparatus for electrochemical analysis. Sampling appliances. Assay furnaces and accessories. Miscellaneous laboratory equipment.

This is a useful little book, treating of the apparatus and appliances required in assay and chemical laboratories. The subject is one that has not been exhausted by previous works.

ANNUAL REPORT OF THE STATE GEOLOGIST OF NEW JERSEY FOR THE YEAR 1907. Henry B. Kümmel, State Geologist. Geological Survey of New Jersey. Pp. 192, illustrated. 5½x9 in.; cardboard covers. Trenton, N. J., 1908: The John L. Murphy Publishing Company.

The present volume continues in part the work which the Survey has been doing on the waterways and water supply of the State. After the administrative report, 86 pages are devoted to reports on the proposed inland waterway from Cape May to the Manasquan river and Bay Head. A second part, of more interest to geologists, covers 72 pages, with many illustrations; it is on the Petrography of the Newark Igneous Rocks, and is the work of J. Volney Lewis. Notes on the mineral industries of the State, with statistics, by State Geologist Kümmel, complete the volume.

METALLURGY. By Henry Wysor. Pp. 308, illustrated. 6x9 in.; cloth, $3. Easton, Penn., 1908: The Chemical Publishing Company; London, Williams & Norgate.

Contents: Physical properties of the metals. Refractory materials and fluxes. Theory of combustion and thermal measurements. Classification and description of the fuels—the natural fuels. The prepared fuels. Ore dressing. Furnaces. Iron ores and properties. Iron smelting—chemistry of the blast-furnace process. Iron smelting—the blast-furnace plant and process. Cast iron. Wrought iron. Steel—the cementation and crucible processes. Steel—the bessemer process. Steel—the open-hearth process. Further treatment of iron and steel. Copper, ores, properties, etc. Copper smelting. Copper refining. Lead, ores, properties, etc. Lead smelting. Lead refining. Zinc. Tin and mercury. Silver. Gold. Nickel, aluminum, manganese and rarer metals. Alloys.

This is a condensed treatise intended for the use of "college students and any desiring a general knowledge of the subject." It is one of the perfunctory works upon its subject, for the multiplication of which there is no good reason. There is a great field for a condensed treatise on metallurgy that will be up to date, not only from the practical standpoint, but also from the scientific. Professor Wysor's book falls far short in both respects.

COMPRESSED AIR PLANT FOR MINES. By Robert Peele. Pp. 325, illustrated. 6x9 in., cloth, $3. New York, 1908: John Wiley & Sons; London, Chapman & Hall, Ltd.

Contents: Structure and operation of compressors. The compression of air. Wet compressors. Dry compressors. Compound or stage compressors. Air inlet valves. Discharge or delivery valves. Mechanically controlled air valves and valve motions. Performance of air compressors. Air receivers. Speed and pressure regulators for compressors. Air compression at altitudes above sea-level. Explosions in compressors and receivers. Air compression by the direct action of falling water. Conveyance of compressed air in pipes. Compressed air engines. Freezing of moisture deposited from compressed air. Reheating compressed air. Compressed air rock drills. Operation of mine pumps by compressed air. Pumping by the direct action of compressed air. Compressed air haulage for mines.

This is an elaborate treatise by a distinguished authority. Professor Peele has endeavored to present a review of current practice as to the construction and operation of compressors, and the application to mines service of compressed air transmission of power, including machine drills, pumps operated by compressed air and mine haulage by compressed air locomotives. The book is of undoubted value and will surely be welcomed by mining engineers.

A GUIDE TO TECHNICAL WRITING. By T. A. Rickard. Pp. 127. 5½x8 in.; cloth, $1. San Francisco, 1908: *Mining and Scientific Press.*

This valuable little book should be in the hands of every young engineer, and its perusal would not seriously injure some of the older members of the profession. Specially commendable is the use of full-faced type for distinguishing words and phrases discussed and for emphasizing the author's maxims. It would have been more graceful had the author acknowledged his indebtedness to "The King's English," an anonymous work published by the Clarendon Press in 1906, and which we judge he has used extensively by his treatment of defining and nondefining clauses, and by a curious similarity we find between his page 54, "Anyone who hopes to write well had better begin by adjuring *somewhat*" (adjuring is, of course, a misprint for abjuring), and page 355 of "The King's English," "It is not too much to say that anyone who hopes to write well had better begin by abjuring *somewhat* altogether."

The arrangement of the book could be improved, especially in the handling of words obnoxious to the author which are scattered through much of the work instead of being confined to one section. The author shows his affection for the impossible word "tailing," a word no human being uses in ordinary speech. Doctor Raymond has written against this idiosyncrasy in one of the late issues of the JOURNAL. A grave omission is the neglect to advise the student to read aloud what he has written. This course is recommended by many textbooks, and the author's favorite work, "The King's English," states that it "is indispensable for everyone who aims at a passable style."

The publishing of a work of this character without an index, as this book is published, is inexcusable, and there should be some fitting punishment for this crime of haste, laziness, or false economy. We suggest either boiling in oil, or reading all of the testimony, arguments, and decisions in all of the apex suits tried to date.

Questions and Answers

Inquiries for information are answered in this department as promptly as possible, but more or less delay is often unavoidable. Many inquiries involve a good deal of investigation and these can be answered only when the general interest in the subject is conceived to justify the expenditure of the time required. Correspondents should refrain from asking for advice that ought to be obtained by professional consultation with an engineer. We will not answer questions pertaining to the value of specific mining enterprises. Inquiries should be framed concisely.

Aluminum Sulphate

Where can I find a market for aluminum sulphate? What is the method of extracting this salt from alunite rock? Can you refer me to any literature on this subject?

P. L.

Aluminum sulphate is a great article of commerce, in which many chemical merchants in the Eastern States are interested. The chemistry of the manufacture was fully described in "The Mineral Industry," Vols. III and VII.

Graphite

How are the different grades of graphite classified and what is the value of each grade? Any other additional information you can give will be appreciated.

S. N. K.

Following is the classification and value per pound of commercial graphite: Flying dust, finest to best, per pound, 1@4c.; dust, 1¼@5c.; chip, 2¾@7½c.; lump, 4@10c.; large lump, 7@10c.

There are three kinds of graphite on the market: crystalline, amorphous and artificial. The last is produced only by the Acheson Graphite Company, of Niagara Falls. The distinction between crystalline and amorphous graphite is purely one of quality, the crystalline being very pure and particularly suited to lubrication, manufacture of crucibles, etc. New York is the chief producer of graphite, and the industry in that State is largely controlled by the Joseph Dixon Crucible Company, of Jersey City, N. J. As a general rule graphites containing 90 to 95 per cent. graphitic carbon are sufficiently pure to meet the requirements of the trade. For further information regarding characteristics of graphite, we refer you to the Journal of Feb. 1, 1908, page 255.

Refining of Gold-silver Bullion

Who are the principal refiners of gold and silver bullion in the United States? Have they any official tariff for work done on toll for the public? If so, what is the rate for the various classes of doré bullion from 700 silver, 150 gold to 950 silver, 50 gold? Is it customary to make any definite deduction on the content in gold and silver given by the correct assay? If so, what are these deductions?

H. K.

The principal refiners of doré bullion in the United States are the American Smelting and Refining Company, Balbach Smelting and Refining Company, United States Metals Refining Company, and the Raritan Copper Works. The addresses of these, and of others also, may be found in the advertising pages of the Journal. The United States Mint Service is also an important refiner of bullion. The revised table of charges at the Mint and Assay offices of the United States, as fixed by the Director of the Mint and approved by the Secretary of the Treasury, July 6, 1908, to take effect July 10, 1908, is as follows:

1. *Melting Charge*: On deposits of bullion a charge of $1 shall be imposed for each 1200 oz. of bullion or fraction thereof, except in the case of uncurrent United States coin and mint fine bars, for which no charge is made.

2. *Parting and Refining Bullion* (rate per ounce gross): On bullion containing 0.250, or less, of gold, and not more than 0.100 base, 1c. per oz.; for each additional 0.050 base, or fraction thereof, in such bullion, 0.5c. per oz. shall be added.

On bullion containing from 0.250 to 0.500 of gold, and not more than 0.100 base, 2c. per oz.; for each additional 0.050 base, or fraction thereof in such bullion, 0.5c. per oz. shall be added.

On bullion containing 0.950 to 0.992 of gold, and not more than 0.008 base, 2c. per ounce.

Bullion containing 0.992 of gold and upward and not over 0.005 base shall be accepted free of the parting and refining charge. But no allowance shall be made the depositor for silver.

All other bullion shall pay a charge of 4c. per oz. and deposits of bullion containing more than 0.800 base must be declined.

For bullion where the alloy is all copper with but one of the precious metals present, the charge shall be 0.5c. per oz. This does not mean to include foreign gold coin, for which the only charges imposed are for melting and extra copper required for alloy. When bullion contains less than 0.0005 of gold, the gold contents shall not be reported for the benefit of the depositor.

3. *Refining Silver* (rate per ounce gross): Upon silver bullion free from gold, assaying 0.998 to 0.998½ inclusive (or over when a depositor demands in payment bars of a higher fineness than his deposit), a refining charge of 0.3c. per oz. shall be imposed and collected; and upon such bullion assaying 0.980 to 0.997½ inclusive, the charge to be imposed and collected will be 0.4c. per oz.; and all such bullion below 0.980 shall be subjected to the parting and refining charge of 0.75c. per ounce.

4. *Toughening Charge*: Charges under this head must be imposed as prescribed in Section 1, Article 6, of Rules and Regulations governing Mints and Assay Offices, taking effect March 1, 1908.

5. *Copper Alloy*: Two cents per ounce of copper required.

6. *Withdrawal of Deposits*: Deposits can be withdrawn subject to charges actually incurred up to time of withdrawal.

7. *Bar Charge*: For fine bars, and for standard or unparted bars—Bars of fine gold, $5000 in value and over, $0.04 per 100; bars of fine gold (less than $5000), assorted sizes, 0.05 per 100; bars of fine gold (less than $500), assorted sizes, 0.07 per 100; small gold bars (less than $5000), assorted sizes, when demanded in payment of deposits where a parting and refining charge has been made, 0.01 per 100; small gold bars (less than $500) assorted sizes, when demanded in payment of deposits where a parting and refining charge has been made, 0.03 per 100; bars of standard gold, 0.10 per 100; bars of standard silver, per ounce gross, 0.00½; bars of fine silver, not less than 500 oz., per ounce gross, 0.00 1/10; bars of fine silver of less than 500 oz. and more than 125 oz., per ounce gross, 0.00⅛; bars of fine silver of 125 oz. and less, per ounce gross, 0.00¼; bars of unparted bullion, per ounce gross, $0.00¼.

8. *Minor Assay Office Charges*: When bullion is deposited for payment in coin it shall be subject to such charges as would be imposed at the mints and an additional charge of one-eighth of one per cent. of the gross value of the bullion.

When the bullion is to be returned to the depositor, the usual melting charge shall be imposed together with the assay office charge of one-eighth of 1 per cent.

Frank A. Leach.
Director of Mint.

The private refiners will buy doré bullion in the New York market on the basis of corrected assay with a deduction of about 75c. per oz. of doré, payment to be made two weeks after sampling. Advances to a reasonable amount may be made upon receipt of the bullion, the remainder of the price being paid upon final accounting.

Hydraulic Air Compression

In the Journal of Aug. 1 was published an interesting article describing the operation of an hydraulic air compressor recently installed at Clausthal. Can you give me further details of the construction of the air separator and air suction pipe, or refer me to the manufacturers of the Clausthal installation?

R. Y.

We do not know the manufacturer of the apparatus installed at Clausthal. However, our correspondent will doubtless find answers to his inquiries in the Journal of Jan. 19, May 4 and June 8, 1907, where other installations of hydraulic air compressors were described. The Taylor Air Compressing Company, of Montreal, Canada, introduced originally apparatus of this kind, and can doubtless supply any information that is desired.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

R. B. Brinsmade sailed from New York, Sept. 30, on a professional trip to the Greater Antilles.

Nels Johnson has been appointed manager of the Franklin County Collieries Company at Lesser, Illinois.

Arthur R. Townsend is in Colorado on professional business, and will return to New York about the middle of October.

C. L. Constant, of New York, has taken the management of the Catawba gold mine, in Catawaba county, North Carolina.

Captain A. J. Overton, of Salisbury, N. C., has been appointed manager of the Portis gold mine in Franklin county in that State.

John W. Benson, of Denver, Colo., who has been examining mines and claims in the Philippine islands, recently left Manila for Hongkong, China.

A. P. Rogers left New York last week on a professional trip which will include Colorado, Utah and Wyoming, and will take about three months to complete.

H. G. Emrich, assistant superintendent of the American Smelting and Refining Company at Perth Amboy, N. J., has been visiting in Colorado during the past month.

Bennett Brown has resigned his position as commissioner of the Southwestern Interstate Coal Operators' Association, to take effect Jan. 1, 1909, on account of ill health.

William Loach, manager of the Wolf Tongue Mining Company in the Nederland district of Boulder county, Colo., is making a business visit to Pittsburg and Washington.

P. A. Babb, general manager of the Mexican Mines Prospects Development Company, has left Mexico for a trip to New York and Boston on business for the company.

D. B. Dowling, of the Canadian Geological Survey, is in the Edmonton district, in Alberta, where he will be engaged for a month making an examination into the coal deposits.

J. W. Johnson and Herbert C. Enos, mining engineers, have removed their offices from the Iturbide hotel to the Quirk building, corner of San Francisco and Gante streets, in the City of Mexico.

J. H. Furman is manager of the Piedmont Tin Mining Company, with headquarters at Lincolnton, N. C. He was for some time connected with the Gold Fields of South Africa, Ltd., in the Transvaal.

J. Will Knight, of Provo, Utah, identified with the management of several Utah mines, has been selected by the Democratic State committee as candidate for governor. His father, Jesse Knight, received the nomination at the convention held recently, but declined the honor.

Professor Coleman, of the University of Toronto, Ont., is returning after an exploration of portions of the Rocky mountains west of Edmonton, hitherto untraversed. His party attempted the ascent of Mount Robson, but were prevented by heavy snowfalls from reaching the summit.

Commencing Oct. 1, the official title of Cortlandt E. Palmer with the Guanajuato Development Company is changed from general manager to consulting engineer in charge. Under this title, Mr. Palmer will continue to direct all operations of the company and its subsidiary companies as heretofore.

H. Kenyon Burch, chief engineer and mill superintendent for the Moctezuma Copper Company of Nacozari, Sonora, Mexico, who during the past two years has been engaged in designing and erecting the company's new 2000-ton concentrator, will leave Oct. 1 for a few days' visit at Globe, Ariz., where he is engaged by the Miami Copper Company as mechanical engineer to design a large concentrator and its adjuncts. Before taking up this work Mr. Burch will travel through Colorado, Utah and Nevada, visiting some of the plants placed in operation during the past year. Mr. Burch has been identified with Phelps, Dodge & Co. for the past five years, having built the Detroit Copper Mining Company's concentrator at Morenci. Upon taking his leave of absence Mr. Burch will be succeeded by Edward Buckley as mill superintendent.

Obituary

Wilhelm J. D. Keuffel died in Hoboken, N. J., Oct. 1, aged 71 years. He was one of the best known manufacturers of engineering and mathematical instruments in this country. He was born in Germany, but came to this country when a young man, and engaged in the business which occupied him for all his active life. About 40 years ago he organized the firm of Keuffel & Esser in New York. Some years ago this was incorporated and Mr. Keuffel was chosen president of the company, holding that position up to the time of his death.

John M. Burke, one of the pioneer miners of the Cœur d'Alenes, in whose honor the town of Burke, Idaho, was named, died in Philadelphia, Sept. 21, the burial taking place at Alexandria, Va. Mr. Burke went to Spokane, Wash., in 1882, from Salt Lake, where he had lived 12 years. His mining operations included the development of a number of properties in the Cœur d'Alenes which have been made large producers. After withdrawing from active mining he took a prominent part in Idaho politics and later went to Reno, Nev., where he again engaged actively in mining.

Cabell Whitehead, whose death was briefly noted last week, died at Nome, Alaska, Sept. 7, in consequence of injuries received two days previous in an accident on the Seward Peninsula railroad. The train was derailed and Dr. Whitehead was thrown into a pool of cold, muddy water under some lumber, which was part of the trainload. He was pinned under the lumber for a couple of minutes, so that his lungs were filled with the silt and cold water. On being extricated, he recovered sufficiently to be able to speak, but acute congestion of both lungs supervened. Dr. Whitehead was born in 1863, at Lynchburg, Va., and his education was obtained, first at Lehigh University, where he was graduated in mining in 1885, and then at Columbia University. His work lay mainly in the assay department of mining, first at Boisé City, Idaho, and then at Washington. In 1895 he went to Europe to investigate methods preparatory to the building of a new mint at Philadelphia. He made a special study of electro-metallurgy and wrote several valuable papers on this subject. In 1898 he established the assay office at Seattle. As consulting metallurgist to the United States Mint he was well known at Washington. He went to Nome in 1900 as representative of the Bureau of the Mint, and shortly afterward founded the Alaska Banking and Safe Deposit Company, of which he was president at the time of his death. He made the first trustworthy report on the future of the mining industry on the Seward peninsula; this was in 1900 and was made for the Geological Survey. He resigned from government service in 1901 and soon afterward organized the Topkok Ditch Company, in connection with Henry Bratnober. As a resident of Nome he took an important part in the development of the Seward peninsula. He was manager and president of the Seward Peninsula railroad, on which he was killed, having resigned control a week before the fatal accident. He leaves a wife.

Societies and Technical Schools

American Society of Mechanical Engineers—The first meeting of the season will be held Oct. 13 by the Gas Power Section in the Engineering Societies building, New York. There will also be a discussion of standards to be used in gas-power work. Two papers will be read, one by E. A. Harvey on gas-producer plants, with data upon costs, performance, etc.; and one by N. T. Harrington, giving the results of tests to determine the loss of fuel weight in a freshly charged producer, due to increase of ash contents in the fuel bed.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at San Francisco, Salt Lake City, Denver, Butte and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

Oct. 2—The Anti-débris Association has again become active in the matter of sending spies out into the mountain regions to see how the injunctions against hydraulic mines now in force are being obeyed. As a matter of fact, most mines of this class have been compelled to quit work owing to scarcity of water.

The dredge of the Calaveras Gold Dredging Company, at Jenny Lind, Calaveras county, owned by W. P. Hammon interests, only worked a part of the time last year, but is now in full operation again, and yielding well. The National Dredging Company, at the same place, has a new dredge called Isabel No. 1, is working in the alfalfa field of the Cutler-Dennis ranch, and getting its power from the American River Electric Company. It has 8½-cu.ft. buckets and is in good paying ground. On the Merced river, near Snelling, Merced county, the Yosemite Dredging and Mining Company started its new machine this month after a long period of preliminary work and arrangement. The dredging ground averages 15 ft. in depth. The company has other tracts under bond and is testing the ground.

After an idleness of two years, the Klau quicksilver mine in San Luis Obispo county, between Paso Robles and Cambria, has resumed operations, impelled by the rising price of quicksilver. The old furnaces and condensers have been placed in good condition, and 25 miners are reopening the mine. San Francisco men have taken hold of the property.

The new find in the West China tunnel of the Brown Bear mine, Deadwood, Trinity county, is proving even better than was at first hoped for. The face of the drift now shows about 11 ft. of $40 milling ore. This vein is supposed to be the Last Chance ore-shoot, which when worked years ago, yielded about six million dollars. The find has brought renewed activity to the district. A few months ago there was not a single lease in Deadwood that was making more than miners' wages, while now the men are eager to continue and will not give up their leases. In the main mine, since the find in the tunnel, Molin & Osgood, leasers, have found a small vein of high-grade ore, and others are searching for the same kind of luck.

Agents of the Oroville Dredging Company have commenced prospecting operations with drills in the Orange Blossom Colony lands in Stanislaus county. Numerous tracts have been bonded and are to be tested as to the value of the gravel under the surface. The colonists will be permitted to remain on their farms at a nominal rental and all but two have signed bonds to sell their property if the drills prove the ground is of sufficient value to dredge.

Goldfield, Nevada

Oct. 1—The railway companies are after Goldfield ores in earnest. The Tonopah & Goldfield is the only road of the three competing lines that is hauling ore in trainload lots. The Tidewater and the Clark roads are more or less handicapped by the fact that smelters on their lines are not ready to handle much ore as yet. From seven to ten carloads of ore a day are being shipped at the present time over the Tonopah line consigned to trust smelters throughout the West, but the greater portion goes to the Peyton Chemical Company's smelter at Peyton, Cal. The shippers are compelled to stand a high rate for freight and treatment.

The Tidewater road is after ore for the old Needles smelter which is being remodeled, and a rate attractive to producers is predicted on all kinds of ore.

The Jerome smelter on the Las Vegas or Clark road is also being renovated and enlarged. The agents of the railway companies have been in the field for the past six months studying the situation and the productive capacity of both the old and the new districts. The completion of the Consolidated and Florence mills will not change the situation for they will have not have sufficient capacity for treating other than their own ores.

These three competing railroads, it is reported, will soon be ready to bid for low-grade ores at a rate which will be as good as can be secured at the local plants.

The Goldfield Consolidated at a recent meeting of the directors decided not to grant nor to extend any more leases than those now running. There are 32 different leases on Consolidated ground affected by this decision. Some that have not yet struck ore but have been working diligently, expecting to get an extension, have ceased operations. Others that have some time yet to run have increased their efforts.

Salt Lake City

Oct. 2—Among the important events of this week was the receipt of instructions by the local management of the Utah Consolidated to exercise the options and contracts for smoke easements on an area aggregating 30,000 acres of land in Tooele county. This movement indicates that the Utah Consolidated proposes to carry out its plan to build a smeltery. Negotiations had been pending for some time with the Guggenheims for a 5-year contract to ship the ore to the Garfield smelter on terms as favorable to the mining company as the existing contract which does not expire until March, 1910, and under the provision of which Utah Consolidated is shipping 800 tons per day. The smelting company has sought a modification and apparently, no agreement could be reached. The building of the Utah Consolidated plant means a new competitor in the field for the Guggenheims, for it is stated that in addition to providing facilities for treatment of its own ore, custom business will be sought. The cost of the proposed plant will be upward of $1,500,000. The Utah Consolidated mine will be connected with the smelter by means of an aërial tramway, eliminating present freight haulage to the Rio Grande railroad of 40c. per ton.

The Boston Consolidated concentrator at Garfield is now treating ore from Bingham on the basis of 1800 tons per day, eight units of the plant being in commission. The feed averages about 1.75 per cent. copper and from 16 to 20 tons are put into one; the extraction during September has been about 75 per cent. During August, the cost of milling per ton was 50c., but the September costs will be lower. A new compressor has been installed at the mine and everything at that end of the enterprise has been shaped to respond with from 3000 to 3500 tons per day when the balance of the mill equipment is installed.

The August production of the Consolidated Mercur mine was about $78,000, or an increase of $8000 as compared with the previous month. The opening of the Magazine vein recently in the Brickyard mine, one of the properties owned by the company, is regarded as the most important development of the year and has added materially to the available ore reserves of the mine.

The Brickyard ore assays about $6 per ton as against $4 per ton in the Mercur mine. The management has given out figures showing that the combined properties of the Consolidated Mercur company have produced 3,225,767 tons of ore, which yielded $13,189,743.34 in gold bullion, or a little more than $4 per ton.

The Iowa-Utah Mining and Milling

Company has bonded a portion of its property in Beaver county to a syndicate of Salt Lake mining operators.

Special meetings of shareholders of the Cedar and Talisman Mining companies have been called to ratify the deal made recently between the directors of the two corporations to effect a consolidation of their respective properties in Beaver county. The Cedar-Talisman Consolidated Mines Company has been organized to absorb the others, shareholders to have equal representation.

The Ohio Copper Company has issued a report which gives the personnel of the new board of directors and that an organization has been effected by the election of James MacFarlane, of Denver, president; Russell Hopkins, vice-president; Carlos Warfield, second vice-president; George Baglin, of New York, secretary and treasurer; Colin McIntosh, mine manager. David Keith, N. J. Catrow, J. P. Hutchison, F. A. Heinze and P. A. Carroll are directors. Out of the 1,500,000 shares, 414,000 are unissued, but 200,000 of the latter have been reserved for the conversion of $2,000,000 six per cent. ten-year gold bonds. Of the authorized bond issue, $400,000 worth have been sold. This company is conducting a vigorous campaign at Bingham and should be in readiness to begin the production of copper soon after the beginning of next year.

Butte

Oct. 1—The early part of the week a deed was filed for record with transfers to the newly organized Davis-Daly Copper Company all of the property in Silver Bow county formerly held by the Davis-Daly Estates Copper Company. The property conveyed, in addition to several city lots in Butte, consists of the following lode claims: Baltic, Smoke House, Ramsdell, Silver King, Thomas, Great Republic, Hibernia, Silver Joe, Jumping Jack, Broker, New Era, Maximillian, Morning Sun, Yellow Jack, Pawnbroker, Charlotta, Mount Moriah, Plymouth and the Carrie.

Douglas B. Sterrett, in an advance chapter of "Mineral Resources of the United States, states that the sapphires mined in Montana during 1907 had an estimated value of $299,800. Fergus and Deer Lodge counties were the principal producers.

The Boston & Montana smelter at Great Falls is now in readiness for operation at full capacity. During the long shutdown subsequent to the flood last spring the reverberatories were remodeled with a view to more economical operation. The new stack, nearly completed, will, it is expected, save the company $15,000 per month by the recovery of flue dust.

At a meeting of the creditors of the Butte Central & Boston Copper Company, bankrupt, held last week, Samuel McConnell was elected trustee of the bankrupt's estate. It is estimated that the company's indebtedness aggregates about $150,000.

Denver

Oct. 2—Although summer is ended, and the first snowstorm of winter has fallen on the mountains of Colorado, it may now be asserted that the mining industry is once more in fine form, and in a more active condition than at any time during the year. There is but little activity in mining stocks, and few properties changing hands, or purchasers looking for mines, but mines closed since last year's money scare are being reopened, and an active winter's work is promised in all the mining camps; this, and investment in mines, appear likely to increase after election.

With the improvement in demand and prices for tungsten ore, operations in the Boulder county belt are beginning to show activity again. The head of the American Smelting and Refining Company, who has just been here, has been predicting better prices for all metals that have suffered a decline.

A meeting of experts of the British, German and Belgian governments, accompanied by the chief of the Bureau of Technology of the United States Geological Survey, and other members was held at the Chamber of Commerce, which was attended by coal-mine operators of this city, and members of the American Mining Congress. The object of the visit of the foreign experts is to investigate the causes of coal-mine disasters, and to devise methods for the better prevention of these horrors. The party has been in Utah and Wyoming, and is now visiting the Trinidad fields south of here, accompanied by the State coal-mine inspector.

Four trainloads of the members of the American Bankers' Association went over the line of the Denver, Northwestern & Pacific Railway (Moffat road). They were accompanied by the mining engineer in charge of the industrial department of the road, who will explain to them the magnitude of the new coalfields and other mineral resources to be opened by that line of railway.

Houghton, Michigan

Oct. 5—A decision was finally rendered by Federal Judge Knappen in the suit brought against the Calumet & Hecla Mining Company by Albert S. Bigelow to restrain the defendant company from voting its stock in the Osceola Consolidated company.

Judge Knappen decided that the Calumet & Hecla company had not violated the Sherman anti-trust law; that it had a right to acquire and vote stock in the Osceola company; that the Osceola company was not guilty of contempt of court; that the temporary injunction restraining this company from holding its annual meeting was dissolved; and the request that the Calumet & Hecla company be permanently enjoined from voting its Osceola stock was refused.

The victory was a sweeping one and the Calumet & Hecla company won on every count. It is believed in certain circles that A. S. Bigelow will attempt to carry the case to the Supreme Court of the United States.

London

Sept. 27—The Cullinan diamond which was presented to King Edward by the Transvaal colony, was sent to Amsterdam for cutting and polishing. The stone has been cut into two large pieces, weighing 1700 and 1000 carats, respectively. The smaller stone has now been cut and finished, and is a circular brilliant of 330 carats of great beauty. This stone is the largest cut diamond in existence. The other half of the original stone is being cut in pendant shape, and is expected to weigh 600 carats. The balance of the stone will cut into several smaller brilliants of great value.

The South African mine-share market, which has had a great rise during the last week, continues strong. The deep levels with long life and producing handsome dividends are in special request. Several of them pay from 7 to 10 per cent. on their present market valuation. There is a general improvement in the profits earned, and the tendency is for profits to be increased along with the reduction in working costs, brought about by the larger scale of operation which is the order of the day. It is now recognized that the lives of the mines have been underestimated. Past estimates of life, although correct for the conditions of a few years back when the limit of payable grade was much higher than it is today, are now out of date. Having regard to the increased life, that is now promised, the investor is justified in accepting a smaller dividend than when the sinking fund for redemption of capital was a matter of greater importance. The native labor returns are at present favorable, but the opening up of new mines may before long make the labor question again a serious difficulty. The general improvement in the position of the producing companies has had the effect of raising the prices of shares in the nonproducing companies.

Investors would do well to examine carefully into the merits of such companies before making a purchase. Among the large number of securities quoted on the South African Exchange there must be plenty of rubbish which the holders will sell to the unwary in a buoyant market. Several new batteries will be adding to the output before the end of the year. The increased output and the general increase in dividends in December which is now assured, are as certain as anything can be to make speculation in South African mining shares active before next Christmas.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alabama

BIBB COUNTY

Little Cahaba Coal Company—This company has purchased the property of the Blocton Cahaba Coal Company at Coleanor. The tract consists of about 800 acres of leased land and several hundred acres in fee. The price paid is said to have been in the neighborhood of $200,000.

JEFFERSON COUNTY

Blossburg Colliery—An explosion of gas at mine B of the Tennessee Coal, Iron and Railroad Company this week killed three miners. It is said to have been their own fault. By direction of the fire-boss, notice had been posted that a part of the mine was unsafe. Before this section could be cleared of gas, several miners disregarded the warning and entered the dangerous section, the explosion following.

Arizona

GILA COUNTY

Miami—This company is reported to have struck ore in shaft No. 2, which is situated 2150 ft. due north of the present mine workings. A churn drill is also said to have struck ore 3000 ft. southwest of the Red Rock shaft.

YAVAPAI COUNTY

Pick & Drill Mining Company—At the properties of this company, near Humboldt, a force of men is completing the installation of the new power plant. A 10-stamp mill is also being installed, and as soon as the power plant is ready for operation the mill will be started and a large force of men put to work in the mine. The ore is of high grade, and about half the value can be saved by amalgamation, the remainder going into the concentrates.

Knight Copper Company—This company has let a contract for driving the main tunnel in 75 ft. farther. Practically all the stock of this company is owned by local men. The formation is in schist, the lode being in contact with a large iron porphyry dike, and the ore occurring as lenses in this dike. The property is three miles from the Humboldt smelter.

Mount Tritle—Application has been made by the creditors of the Mount Tritle Copper Company for the appointment of a receiver. The application is to be contested.

Gold Ridge Mining Company—This company has put a force of men at work on the Mark Hanna and Grub Stake claims in the Congress district. Byron Smith has been placed in charge as general manager. The United Mines Company, which is operating the Ohio group immediately adjoining the Mark Hanna, is installing a 10-stamp mill.

Shylock—The company has let a contract for 300 ft. of sinking, and the work has been begun.

Tip-Top Heath—This company has completed building a wagon road into its property from the railroad, at a cost of $5000. Work is now being carried on to clean out the old workings to reach the rich orebodies known to exist. Superintendent Wager states that the company will commence shipping tungsten ore within the next 30 days, and silver ore will be shipped until reduction works can be put on the property.

Esperanza—W. J. Martin and C. K. Hartzsell have finished sinking 60 ft. on this claim in the Sols Wash district, in the southern part of the county. They have now reached a depth of 250 ft., and have about 10 inches of high-grade gold ore. They will continue the work by contract.

Mount Elliott Consolidated—The mill has been shut down for repairs. It is stated that grading will soon be commenced for the site for a new and larger mill, as the 10-stamp mill has been proved inadequate to handle the output of the mine. A force of men is at work blocking out ore and doing development to increase the output sufficiently to supply 50 more stamps.

California

AMADOR COUNTY

Argonaut—Good ore has been discovered on the 2700 level of this mine at Jackson, and developments in the Hoffman ground are also encouraging. The management has withdrawn the proposal to deed to the Apropos company the mineral rights on the Hoffman ground.

CALAVERAS COUNTY

Washington—At this mine, at Sheep-ranch, work has been commenced by the Nevada company, which has bonded it.

Lone Star—In the north extension of this mine at West Point, Zavella & Marchand have struck rich ore.

Ritter—It is expected that 10 stamps, concentrators and a cyanide plant will be installed.

HUMBOLDT COUNTY

Low Divide—Some sample shipments of copper ore from these mines have been made to the Tacoma smelter.

INYO COUNTY

Lead Crown Group—H. M. Gibson, P. W. Forbes and other owners of this group of silver-lead mines in Black cañon in the White mountains, are sinking a shaft and driving a tunnel on the property. Good galena ore has been found.

Four Metals Mining Company—This company will shortly have the stations for the 9-mile tramway between Cerro Gordo and Keeler in place, and when this and the smelter are finished the chloriders on Cerro Gordo hill can sell their ore to this company.

MARIPOSA COUNTY

Mariposa Commercial and Mining Company—Manager Frank T. Maguire, of this company, has machinery and lumber on the ground at the Mariposa mine and expects to complete the new mill in a few weeks.

NEVADA COUNTY

Prudential Mining Company—This company, formerly the New York-Grass Valley Company, has settled its differences with the ditch company and has started pumping out the old Perrin mine in Grass Valley. The mine is about 500 ft. deep and it will take two months to unwater it.

Norambagua—H. S. Abbott, acting for the company which has purchased this Grass Valley mine from the Campbell estate, has made the first payment of $5000 on the purchase price. The shaft is down about 600 ft. and the company has its own water rights, sufficient for power purposes.

Deadwood—This property, adjoining the Lecompton at Willow valley, has been bonded to A. M. Gilbert, of Santa Barbara, who will begin development work at once.

Ironclad—Money has been raised by a Mansfield, O., company to reopen, unwater and develop this property at Rough and Ready. A three-compartment shaft is to be sunk and a pumping plant installed. A new compressor has been ordered.

PLACER COUNTY

Lost Emigrant—This mine, near Truckee, idle for some years, is being reopened and developed. A 10-in. vein of $40 free-milling ore is being worked.

Colorado

Boulder County

Jaeger—This group, at Glendale, has been sold to Denver men for $20,000. E. G. Hurst and associates are the purchasers and they may install a plant of machinery.

Annuity—Manager Yates has returned from Boston, Mass., and resumed work on the Dolly Varden holdings at Sunset. The company will remove the mill in Pennsylvania gulch to the mine and install modern machinery for economical handling of ores.

Tungsten—The Phillip Bauer Company has announced that it will pay $5 a unit for 60-per cent. ore and on account of the increased price for tungsten ores, more work has been started up on several properties in the Nederland section. Two carloads of tungsten concentrates worth about $12,000 have been shipped to the Firth Steel Company, Pittsburg, during the past two weeks.

Ward Gold Cyanide Milling Company—Contracts have been awarded during the past week for the erection of two units of 25 tons each, as the preliminary for a 150-ton mill at Ward to treat the iron sulphide ores of the district.

St. Louis—Kansas City men, owning this mine at Glendale, have resumed operations with William Emmett as superintendent, having overhauled machinery and unwatered the shaft.

Blossom Mining Company—A decree of foreclosure has been entered in the district court against this company, owning property near Springdale, the amount being $120,676.

Clear Creek County

Conqueror Mining, Power and Reduction Company—Massachusetts men are interested in the purchase of six patented claims and placer property on Silver mountain, at Empire and are arranging for the installation of additional machinery.

Alice—A. H. Roller and W. R. Shaffer, of Idaho Springs, who have been testing the large low-grade orebody of the Alice in Upper Fall river district have concluded their tests with a 25-ton experimental plant, and have gone to Utah to look over some of the big cyanide plants, with the intention of building a 200-ton plant, which may be later increased.

Indiana

Clay County

A number of coal mines in the Block-coal district resumed operation Oct. 5. These mines were closed last April, at which time the operators requested the miners to continue work under the old scale till a new one was agreed upon, but they refused. The mines were then working almost full time, and a number of important contracts were switched to other fields. As a result the miners sought work elsewhere, but many of them failed and returned to the district. They have been idle all summer and admit they made a mistake in refusing to work on under the old scale. One of the largest of the mines to resume is No. 3 of the Miami Coal Company, which employs about four hundred men.

Pike County

The mines in this county are now running on a little more than two-thirds time. The new mine at Massey, opened since the old mine was destroyed by back water from the Patoka river, will soon be employing a large force of men. The tipple-house is completed, and the main switch with the railroad will be ready in a few days. The mine is owned by the Peacock Mining Company of Indianapolis but will be operated by Commodore Bugg, of Oakland City.

Michigan

Copper

Atlantic—The shaft on the Section 16 tract of this company is nearing the 18th level and continues in very shattered and disrupted ground requiring close timbering. The south drift from the 12th level is within 30 ft. of the company's boundary line. At the 13th level encouraging ground is being exposed and rock coming from these drifts will soon be shipped to the mill. The 12th-level drift will eventually connect with the drift from the same level of the Baltic, which will then afford better ventilation and a second means of communication with the surface.

Centennial—Work on the two additional heads in the stamp mill, owned jointly by this company and the Allouez, is being pushed. When this additional stamping capacity is complete the mines will increase their output. In case the full capacity of the mill is not required, the Calumet & Hecla, which owns control of both properties, may use it for treating rock from some of its other properties. Underground conditions at the Centennial are encouraging; the drift to the north is entering a highly mineralized zone tributary to the South Kearsarge.

Ahmeek—This company has secured a mill site on the shores of Torch lake, in close proximity to the Tamarack-Osceola mills; work on a modern 4-head stamp mill has been started. Excavations are being made on the sites of the two new shafts and about 40 ft. of overburden will have to be passed through before the ledge is reached.

Superior—The new frame shaft-house on the site of No. 1 shaft has been erected and will soon be in shape to handle rock. A new engine-, boiler- and change-house is in course of construction and when finished the surface equipment will be complete. The crosscut from the 10th level showed the lode to be nearly 50 ft. wide at that point and highly mineralized.

Calumet & Hecla—This company has completed the electrification of its pumping station on the shores of Lake Superior, a 3,000,000-gal. electrically-driven centrifugal pump replacing two steam reciprocating pumps of a combined capacity of 2,800,000 gal. At the stamp mills work on the new regrinding mill is progressing favorably and a portion of it will soon be ready to treat the tailings. The company has just started two additional 200-h.p. motors, driving the washing machine for 11 heads in the Hecla mill.

Rhode Island—A good grade of rock is being encountered in the winze, which this company is putting down in the south drift from the 10th level.

Quincy—A hoisting plant is being installed on the site of the company's new Pontiac shaft. The old shaft has been cleaned out and sinking will soon be resumed. This shaft will command the ground tributary to the tract purchased from the Arcadian about two years ago.

Missouri

Joplin—Zinc-lead District

Center Creek Mining Company—This company, of Kansas City, capitalized at $1,000,000, has refiled its papers of incorporation in Jasper county and established its main office in Webb City.

Osyka—This company has developed a 40-acre lease east of the Kalitan mine east of Joplin on Turkey creek; 22 drill holes are in ore.

J. E. Snavely & Co.—This company of Springfield men has leased the Wheat & Smith land southeast of Aurora, and will drill the land at once.

Toreador—This company at Alba will build a new mill of 400 tons capacity and remodel its old mill into a tailing mill of 300 tons capacity.

Silver Moon—This company has incorporated with a capital stock of $20,000. The stockholders are G. J. Patterson and Robert Milne, of Joplin, and W. E. Foreman, of Kansas City.

Lucky Budge—This company, operating at Prosperity, has reduced its capitalization from $400,000 to $100,000.

Lichliter Milling Company—This company has started its tailing and sludge mill on the Calumet lease at Neck City. It has about three years' run on rich tailings.

Wattes Brothers—These mine operators will move their San Gabriel mill of 500 tons capacity from Porto Rico to their tract west of Joplin where 24 acres have been proved with four shafts and 36 drill holes in ore.

C. W. Edwards—A good lead strike has been made at 35 ft. depth on the Edwards land in Kansas City bottoms at Joplin by G. W Seibert, J. T. Risler

and associates. There are now nine prospects in Kansas City bottoms.

Granby—The same run of lead ore as found on the Yale & Leonard lands in Leadville Hollow, was struck on the Granby land, and 65,000 lb. of ore was taken out the second week from a shaft 22 ft. deep.

Montana

Butte District

Butte-Milwaukee—This company, after a shutdown of several months, has resumed operations on its Colonel Sellers claim. A crosscut is being run south on the 200-ft. level for the purpose of intersecting two veins, the outcroppings of which appear on the surface. The recently installed Nordberg hoist, good for 3000 ft. depth is in use.

Butte-Carlisle Copper Mining Company—The company has recently been formed by Duluth and Michigan men, and is capitalized at $1,100,000, with shares of the par value $1. The company will operate the Carlisle and Protection claims which lie north of the Berlin claim of the North Butte Company, and in the vicinity of the Butte & Superior properties and W. A. Clark's Elm Orlu mine. The directors are M. A. Ryan, Charles Bergson, Henry Kimpel, Edward Lynch, and Fred. C. Harris. The company intends, as soon as the surface plant can be installed, to sink to a depth of 1600 ft. before doing any crosscutting or other development work.

Butte-Montana—An initial payment of $10,000 on the option of the company's stock was made last week by eastern capitalists. It is understood that work on the company's Alec Scott mine will begin shortly under the direction of R. A. Kerr. The shaft is down 1200 ft. Work will be directed principally toward the development of the orebodies from the 100-ft. level to the 1200-ft. level, with a view to determining the apexes of the veins.

North Butte Extension—At a meeting held in New York, Oct. 6, the directors appointed a committee to prepare a plan of reorganization for the company for submission to stockholders as early as possible. The stock of the company is non-assessable, but it is expected that the plan will call for a subscription of 50c. a share. The committee appointed to work out the reorganization consists of R. J. Horner, George N. Orcutt, C. H. Moore, A. M. Andrews and J. O. Morris, of Chicago. W. D. Rollins is secretary; and W. H. Dowe and W. J. Patterson are counsel to the committee.

Nevada

Churchill County—Wonder

Hidden Treasure—Work has been started on the Hidden Treasure adjoining the Nevada Wonder on the northwest. The shaft is 180 ft. deep, and shows a vein 72 ft. wide; the ore consists of porphyry alternating with streaks of quartz rich in silver.

Wonder View—Operations are to be resumed on this property; the adit is 800 ft. long and has exposed considerable milling ore.

Wonder Queen—Work on the first lease on this property has begun. During the first day 17 sacks of ore averaging about $200 per ton were taken out. The lease has 18 months to run.

Esmeralda County—Goldfield

Output—The production last week amounted to 2371 tons valued at $213,750. The Combination mill treated 525 tons of run-of-mine ores and 84 tons of high-grade ore valued at $33,000. The Western Ore Purchasing Company handled from: Mohawk Jumbo, 295 tons; Engineers lease, 252; Florence Consolidated, 242; Consolidated Red Top, 151; dump ore, 14; Kinkead concentrates, 11 tons. The Nevada Goldfield Reduction Company treated from: Combination Fraction, 257 tons; Baby, 7; Mohawk Jumbo, 40; Little Florence dump, 39; Consolidated Red Top, 30; Mohawk Florence, 25; Florence Annex, 35; Mohawk Combination, 25; Begole Syndicate, 280 tons.

Engineers Lease—This lease on Florence ground has just declared its fourth dividend of $90,000 making a total of $360,000 paid since the ore was cut June 15. It has shipped and received settlements for $650,000 of ore and is now producing at the rate of $6000 per day. All this ore comes from above the 300-ft. level.

Kewanas Extension—Sinking has been resumed; the shaft will sink to a depth of 600 feet.

Consolidated Red Top—Returns from the last four shipments consisting of 60 tons each show that the ore averaged $125 per ton. The ore carries $1 silver, the rest in gold. Stoping is now in progress on the 225-ft. level; considerable ore is coming also from the raise from the 150-ft. level.

Florence Annex No. 2—The Florence Gem has been reorganized and is now known as the Florence Annex No. 2. The lease has six months to run from Sept. 1. The lease now consists of a block of ground, 250x300 ft., lying between the Baby and the Engineers leases.

Rustler Fraction—This lease has let a contract to sink the shaft from the 500 to the 600-ft. level.

Hazel Goldfield—The Hazel shaft is the deepest shaft on any lease in Goldfield as it is now 642 ft. deep. The next station will be cut at the 750-ft. level.

Goldfield Souvenir—A contract has been let to sink the Souvenir shaft 100 ft. deeper.

Goldfield Consolidated—The Claremont shaft which is to be the main working shaft for all the company's properties is 580 ft. deep. A new hoist capable of working to a depth of 1400 ft. has been ordered for this shaft. The Combination mill during August treated 2672 dry tons of ore, the average return from which was $44.41 per ton.

Nye County—Tonopah

The ore production last week amounted to 5243 tons, valued at $141,225. The Tonopah Extension company shipped 90 tons; MacNamara, 300; Tonopah Mining Company, 3200; Belmont, 550; Montana-Tonopah, 733; Midway, 100; West End, 150; Jim Butler, 120 tons.

Belmont—A total of 188 ft. of new ground was opened up last week. The winze in the big vein on the 1000-ft. level has reached a depth of 100 ft. The raise from the east drift on the South vein on the 900-ft. level shows a 4-ft. vein of good ore.

MacNamara—The No. 3 stope on the 275-ft. level this week broke into a body of high-grade ore. This vein has always had an average width of 3 ft. of good ore, but the ore has now widened to 5 ft., with 3 ft. showing large bunches of ruby and brittle silver. Arrangements have been made with the Montana-Tonopah Company to use 10 stamps in their mill for treating MacNamara ore. Last week four carloads were shipped to the smelter and one carload to the Belmont mill. Nearly all of this ore came from No. 2 and No. 3 stopes on the 275-ft. level.

Midway—The first or 200-ft. level is being prospected. A station has been cut and all the necessary equipment put in place.

Tonopah Mining Company—The three-compartment shaft was sunk 15 ft. during the week, the total depth now being 1195 ft. The formation in the bottom is calcite, showing no change. No progress was made in the drive hole from the bottom of the Red Plume shaft.

Nye County—Manhattan

Stray Dog—Work has been resumed on the Stray Dog, one of the "Larry Sullivan" properties, after a long idleness; 20 men are at work. The ore will be treated at the Peterson mill, which is owned by the same people who have taken the Sullivan properties under a five-year lease.

Mineral Hill—The shaft has been unwatered, and sinking has been resumed. The shaft is at present 236 ft. deep, and will be sunk an additional 200 feet.

Manhattan Consolidated—A trial run on 60 tons of ore at the Peterson mill averaged $32 per ton.

Lander County—Austin

Berlin Mines—These mines recently purchased by the Blue Bell Mining Company, of Goldfield, are being reopened. The track and pumps which were removed

when the mines closed down are being replaced. Mining and milling will begin within 30 days. The lowest workings are 800 ft. deep.

NYE COUNTY—ROUND MOUNTAIN

Operations on the Melvin group of tungsten claims which adjoins the famous Round Mountain Monster tungsten property, are progressing rapidly. The adit is now 200 ft. long, and at that point a crosscut 80 ft. long has been driven. The entire distance of 280 ft. has been seamed with stringers of tungsten ore, the richer portions of which have been sacked as broken. About 500 tons of milling ore is on the dump.

LINCOLN COUNTY—SEARCHLIGHT

Searchlight Consolidated Company—Work has resumed at the Oregon. The main shaft is now being unwatered.

Duplex—A large shipment of machinery is en route for the Duplex. This consists mainly of improvements for the mill.

Cyrus Noble Mining Company—Creditors of this company bought the property at sheriff's sale at Pioche last week for $30,000. The Searchlight Parallel has leased the Cyrus Noble mill, and is treating dump ore.

WHITE PINE COUNTY

Giroux—It is reported that operations in the concentrating mill and the smelter will be begun immediately.

Oklahoma

OTTAWA COUNTY—MIAMI

Miami-Yankee—This company has purchased the McCord mill at Joplin and will have it moved to its mine at Miami.

Barnes—J. W. Barnes and associates have struck rich ore at 144 ft. depth and a 19-ft. face has been shown in seven drill holes. The Emma Gordon and other Miami mines are at the 100-ft. level.

Oregon

JOSEPHINE COUNTY

Almeda Consolidated Mines Company—This mine, in the Galice creek district, has been opened by six adits and about 3000 ft. of development work has been done. The ore carries gold, silver and copper. The main vein is 20 ft. wide.

Pennsylvania

ANTHRACITE COAL

Delaware, Lackawanna & Western Coal Company—This company is putting down one of the largest air shafts in the anthracite field. It is to be sunk to the Baltimore seam, and when completed will be 850 ft. deep.

BITUMINOUS COAL

Latrobe Coal Company—After having been down to 16 ovens part of the time and 55 ovens the balance of the time, since early last winter, the company has fired its plant in full, putting the entire 138 ovens in blast, and putting a full force of men at work, every day in the week. The outlook throughout the Connellsville region has improved materially during the past week.

South Dakota

CUSTER COUNTY

Saginaw—The annual meeting of stockholders resulted in the election of the following directors: I. W. Herber, Custer; Louis Hahn, New Hamburg, Ont.; E. A. Abbott, and George Thompson ,Columbus, O. and B. Eilber, Ubly, Mich. The company is successfully operating its new mill and will make a cleanup about the first of the month.

LAWRENCE COUNTY

Branch Mint—The work of unwatering the mine will be commenced at once which will require about 10 days. The old drifts will be further developed by a large force of miners.

Pennsylvania—Superintendent Hayes is preparing to unwater the 150-ft. shaft before commencing an adit into the hill to discover the main orebody. The property in Rutabaga gulch has been idle for years.

Golden Crest—Work has been resumed by the Detroit owners and grading for the new 200-ton mill has commenced. The plant will use the Moore process and tube mills for regrinding and is expected to be in operation by late fall.

Gilt-Edge-Maid—The operating cost has been reduced and the company is now handling ore averaging about $2 a ton gold at a profit.

Crown—St. Paul, Minn., capitalists have taken hold of the property in the Caliboga district and will operate at once. Two shafts are down 65 ft. and one will be sunk to the 300-ft. level. There is a body of free-milling gold ore that will be opened up.

PENNINGTON COUNTY

Hymalulu—A gold orebody has been encountered at shallow depth. The body has been stripped for 18 ft. and the walls not found.

Crown—A. E. Wyatt, of Rockport, Mo., and associates have taken hold of the property on Castle creek and are developing. The lode is 30 ft. wide and carries gold. A mill will be erected to reduce and treat the ore.

Reder Placer—Receiver Kamman, of the Harney Peak Tin Mining Company is awaiting a decision from the Government on the nature of the ground. The Government believes it to be agricultural and not mineral.

Utah

JUAB COUNTY

Mammoth—This Tintic company has resumed ore shipments, the product going to the Independent smelter at Ogden for treatment. The ore averages about $30 per ton, net.

Lower Mammoth—Since the closing of the Tintic smelter production from this property has ceased, but energy is being vigorously applied toward development. A new orebody, one that is relied on for large returns, was encountered in a raise from the 1600-ft. level.

Gemini—Ore shipments have been resumed from this Tintic property. The mine has been opened to 1900-ft. depth.

SALT LAKE COUNTY

Silver Shield—This company has recently purchased new equipment for its Bingham mine and the order includes an electric mine locomotive. The mine has been opened by an adit 9280 ft. long.

Wisconsin

ZINC-LEAD DISTRICT

Benton—The Frontier mine is shipping three cars of concentrates weekly that assay 44 to 49 per cent. zinc, besides making a considerable tonnage of low-grade ore and about a ton of lead concentrates daily; the net earnings after paying 10 per cent. royalty range from $1500 to $2000 weekly. The Etna and Pittsburg-Benton mines continue to make large shipments.

Baxter—This mine is shipping regularly and is again being successfully operated under local management.

Blackjack—The stockholders are in litigation among themselves, which is likely to keep the mine closed down for some time.

Bureau—This mine, formerly the Swift & Looney, is about to build a new 50-ton mill to replace the one lost by fire.

Cuba City—The Dall mine has declared a dividend of 10 per cent. and has become a large shipper of lead as well as zinc. A new shaft is being sunk and another boiler is being installed.

Fox Mining Company—The stockholders decided to erect a roasting plant of 20 tons daily capacity at the recent annual meeting.

Galena—The Vinegar Hill mine is operating again, after a temporary shutdown. The water inflow, formerly very heavy, has largely decreased since the local basin has been exhausted and there is now barely enough water for milling.

Hazel Green—The new 100-ton mill of the Kennedy mine is now in operation. It is located at a new shaft on the West hill; it is run by gasolene engines. This is the first company in the Wisconsin district to operate two mills on one orebody.

Murphy Mining Company—This company is pushing new developments by drilling.

United States Zinc Company—This company, formerly the Mills Mining Company, is making the largest output of the district, as the mill is treating 200 tons a day; the company has let a contract for a roaster-magnetic plant of 50 tons daily capacity.

Canada

ALBERTA

The Canadian Northern Railway Company, which owns 20,000 acres of coal lands in the vicinity of the Brazeau river, in Alberta, has had a preliminary survey made for a projected line from the property to tap the Grand Trunk Pacific Railway at a point between the Pembina and McLeod rivers. The line will be about 50 miles in length, and the grades will be all in favor of the traffic. Tests have been made of the coal which has been found well adapted for steam purposes and much harder than the coal found near Edmonton.

BRITISH COLUMBIA—BOUNDARY DISTRICT

Granby Consolidated—At the annual meeting in New York, Oct. 6, William A. Nash was elected a director to succeed George A. Baker, Jr., who resigned. Other directors were reëlected. President Langeloth reported that the total tonnage of Granby and other ore amounted to 882,661 dry tons, against 665,955 in the previous year, and there were produced 21,126,926 lb. of copper, against 16,403,497 lb. in the previous year, the cost per pound of copper produced, after deducting the value of gold and silver, being 10.24c. The business depression, bad fires in districts where the company owned property, including the Crow's Nest Pass coal fires, and the great decline in the price of copper, worked against the company's net earnings, which were $606,522, a decrease of $1,318,415, leaving a deficit of $320,577, which with the previous surplus of $2,775,758 left a surplus of $2,455,181 at the close of the year. The average price realized for fine copper was 13.3c., and the net cost 10.31c. per pound.

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore for the week ending Sept. 25 were as follows: Buffalo, 62,000 lb.; Cobalt Central, 50,000; Drummond, 60,000; La Rose, 146,000; McKinley-Darragh, 52,530; Nipissing, 231,590; O'Brien, 122,480; Right of Way, 61,660; Silver Queen, 249,000; Temiskaming, 60,000; Temiskaming & Hudson Bay, 60,000; total, 1,155,670 pounds.

Amalgamated—A narrow vein has been found with wall rock heavily shot with leaf silver. This discovery is within 100 ft. of the Nipissing property, and runs toward that mine.

Silver Bird—This property has been leased to Samuel D. Madden, of the Little Nipissing mine, who will commence work at once.

Watts—A new vein, 10 in. wide, has been struck at the 200-ft. level; silver also shows freely in the wall rock which is about 4 ft. wide. More than 5000 ft. of development work has been done and a three years' supply of ore has been blocked out. A 20-stamp mill has been installed with a capacity of 50 tons of ore daily.

NOVA SCOTIA

Dominion Coal Company—The output for the eight months ending Sept. 30, amounted to 2,865,619 tons, as against 2,587,911 tons for the corresponding period of 1907. The September output, however, shows a falling off, accounted for by some of the company's steamers being delayed for a considerable time by the smoke from forest fires, interfering with navigation on the St. Lawrence.

YUKON TERRITORY

Recent official advices from the Yukon state that the gold production of the Territory for the current year will be larger than for years past, owing to the new method of hydraulic mining introduced. For the first time in the history of the Territory the dredges will be busy until the ice forms late in October. Individual claim-owners have had a busy season. The big ditch of the Guggenheims, which gave employment all season to over 2000 men, is nearing completion. Some discoveries of quartz were made during the summer. Little work is in progress in the White Horse copper district. The White Pass & Yukon Railway has suspended operations on the new branch line to the mines as the mine-owners declined to guarantee a certain monthly tonnage.

Mexico

CHIHUAHUA

Parral Output—The estimated production of the Parral camp for the week ending Sept. 25 was 9280 tons, of which 5390 tons were treated locally and the remainder sent to outside smelters. The August output amounted to 43,010 tons, of which 17,820 tons were of smelting class.

El Rayo—This Santa Barbara company produced $53,000 worth of bullion during the month of August and $30,000 worth during the first 15 days of September.

Hinds Consolidated—This company is prosecuting vigorous developments at its Reforma and Clarines mines in the Santa Barbara camp. Ross B. Watkins was lately appointed general manager to succeed W. W. Elmer resigned, while J. J. Hollister, formerly in charge of the Peregrina mines has been selected for the position of assistant manager.

Concepcion—Silver-bearing lead-carbonate ore is reported opened up in minable quantities at this property in the Rio Florida district about 35 miles from Jiminez. R. J. de Morambert and John Harvey are the operators.

Greene Concession—It is given out, on apparently reliable authority, that Col. W. C. Greene's 3,000,000-acre concession in this State and in Sonora has been extended to Jan. 12, 1909, one year longer than the original grant.

Santa Elena—The sale of this lead-silver property in the Terrazos district for a stated consideration of $30,000 is announced. The property belonged to Anderson & Scabell, of Chihuahua and the purchaser is J. P. Hutchinson, of Chicago. This makes the third property transfer in that camp during the past six weeks.

Rio Tinto—Corrigan, McKinney & Co., who lately acquired the Rio Tinto mines and copper-matting plant, as well as other properties in the Terrazos camp, 25 miles north of Chihuahua, are reported to be planning the immediate erection of a 300-ton smeltery. Better facilities for the transportation of the ore from the district mines to the reduction works will also be provided. R. B. Hutchinson is the manager and Capt. M. D. Murray is superintendent.

Gavilana—Metallurgical tests are now in progress at these silver mines in the vicinity of San Jose del Sitio, with a view to the early erection of suitable reduction works. The tests are being made under the direction of F. C. Pierson, of El Paso, Texas.

GUANAJUATO

Tajode Dolores—The Catlin & Powell Company, acting on behalf of the Proprietary Mines Company, of America, has taken over the option held by W. Murdock Wiley on this mine situated in the Peregrina-Cubo district. The property is owned by W. H. McCord and L. M. Fairbanks, and is developed to a depth of 500 feet.

Pinguico—The company paid on Oct. 1 its regular semi-annual dividend of 3 per cent. amounting to $60,000 to its preferred stockholders.

Cuba

SANTIAGO

Holguin-Santiago Mine Company—In August this company shipped $20,000 in gold bars. This mine has been taken over by a Cuban company under the direction of Jose M. Govin, the editor of *El Mundo*. New installations are contemplated, and the engineer, W. F. Grey, has recently reported some excellent prospects on a number of new claims acquired by the company. The adjoining mine, La Casualidad, has about 20 men employed under the direction of J. F. Abelspies. Another undeveloped mine, on the same vein to the east is the Relampago.

New Caledonia

Exports of ores from the colony for July and the seven months ended July 31 are reported by the *Bulletin du Commerce*, of Noumea, as follows, in metric tons:

	July.	Seven Mos.
Nickel ore	21,564	73,645
Cobalt ore	440	2,448
Chrome ore	2,679	16,548

In addition there were reported 3 tons of copper ore and 6 tons of lead ore. The exports of chrome ore in July were all to the United States.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Oct. 7—Coal trade in the West seems to be about at a standstill. The cold snap lasted only a few days, not long enough to stimulate domestic trade to any great extent. Steam coal is not in any better demand, but the question of winter supplies is coming forward.

The Lake trade is disappointing. Coal for the North and Northwest usually carried on Lake Superior docks for the summer demands is still standing. It is usually moved by Sept. 1 to make way for the winter supply. This moving is in progress now, but operators fear that before the usual supply for winter can be hauled to replace it, navigation on the lakes will be closed. Should demand revive, a good deal of coal may have to be moved by rail.

The miners and operators in Montana and Wyoming have reached agreements on the mining scale, and work in both those States has been resumed. In Washington a meeting is being held in Seattle this week to form a new agreement.

In the East trade continues quiet, with no special feature. Pennsylvania mines are still in trouble on account of short water supply.

In the matter of the commodities clause of the inter-State commerce law, an appeal from the decision of the Circuit Court to the United States Supreme Court has been allowed.

Coal Traffic Notes

Tonnage originating on Pennsylvania railroad lines east of Pittsburg and Erie, year to Sept. 26, in short tons:

	1907.	1908.	Changes.
Anthracite.....	4,176,304	3,728,132	D. 448,172
Bituminous.....	28,746,087	24,120,590	D. 4,625,497
Coke.....	10,407,260	5,035,728	D. 5,371,532
Total.....	43,329,651	32,884,450	D. 10,445,201

Total decrease this year to date was 24.1 per cent.

Shipments of Broad Top coal over the Huntingdon & Broad Top railroad up to the end of September were 749,674 tons in 1907, and 443,470 tons in 1908; a decrease of 306,204 tons.

New York

Anthracite

Oct. 7—No change has taken place in the hard-coal situation during the week and business continues dull. Buckwheat coal continues in fair demand, but other sizes are inactive.

Schedule prices are $4.75 for broken, and $5 for egg, stove and chestnut. Steam size prices are unchanged: Pea, $3.25@3.50; buckwheat No. 1, $2.35@2.50; buckwheat No. 2 or rice, $1.60@2; barley, $1.35@1.50. All prices are f.o.b. New York harbor points.

Bituminous

There is a little activity displayed in certain consuming districts, notably the Sound, and to a lesser degree at shoal-water ports. It is not believed in the trade that this is any more than a slight flurry. In New York harbor trade has not improved and good grades of steam coal fetch $2.50@2.65 with poorer qualities selling around $2.40. A little demurrage coal is reported to have been offered at as low as $2.25@2.30. Transportation is better and there does not seem to be any scarcity of cars.

In the Coastwise vessel trade large vessels are still in short supply and the demand is not particularly good.

Nevertheless rates are firm, although unchanged from last week. Rates for large vessels from Philadelphia are: Boston, Salem and Portland, 50@55c.; Lynn, 60@65c.; Portsmouth and Bath, 60@65c.; Newburyport, Gardiner and Bangor, 65@70c.; Saco, 90c.@$1; Providence, New Bedford and the Sound, 40@50c. per ton.

Birmingham

Oct. 5—Coal operations in Alabama cntinue to improve. Good prices are obtained, there being but little change from those that prevailed while the strike was on.

A battery of coke ovens at Bessemer, will be in full operation by the end of this week. Efforts are to be made to accumulate some coke if possible before cold weather.

Chicago

Oct. 5—Sales of domestic coals have been somewhat better, owing to cool weather, but show signs of weakening. Steam-coal sales have not increased notably. Supplies of most coals are large and the consequence is depression of prices.

Lump and egg from Illinois and Indiana mines hold at $1.85@2.25; run-of-mine, $1.50@1.75; screenings, $1.20@1.40. Brazil block is fairly firm at $2.25@2.35.

Eastern coals are not so strong. Smokeless is down to $3.05@3.30 for run-of-mine, from a circular price of $3.45, with lump at $4.05@4.30. Hocking is rather dull at $3.15. Youghiogheny holds to $3@3.15 for ¾-in., with the movement steady on contracts.

Cleveland

Oct. 6—An unusual transaction this week was the shipment of a cargo of coal from Cleveland to Buffalo. It was West Virginia coal, consigned to the Lackawanna Steel Company, and was the second cargo of the kind this season. The water rate from Cleveland to Buffalo was 20c. per ton. It is said that there was a considerable saving as compared with delivery to Buffalo by all rail.

Indianapolis

Oct. 6—During the past week, or since the advent of the first cold day following the breaking of the drought, the local coal trade has been unusually brisk. During the last six weeks the quantity of domestic coal sold here was considerably less than half that usual at this season. However, orders are now coming in in bunches and dealers are busy. Prices have not advanced, though consumers seem to anticipate it. Most of the orders now are for Indiana, Ohio and West Virginia coals. The market for hard coal is quiet.

The conditions at the Indiana mines, while considerably improved, are not up to expectations. The low stage of water in the Ohio river is giving Indiana some orders for shipment to points in the South usually supplied by the Pittsburg district. This is being shipped by rail.

Pittsburg

Oct. 6—The coal situation continues dull. Conditions are worse than a week ago, operation of the mines in the Pittsburg district not being more than 50 per cent. The railroad mines are merely running to keep up shipments on Lake contracts with little doing for local consumption, and the river mines are down entirely. Despite the dull conditions, prices are being held firmly by the large producers on the basis of $1.15 for mine-run coal at the mine, and slack is selling at 40@50c. The Pittsburg-Buffalo Company, which is increasing its capacity and has plans for extensive additions, is not rushing the work.

Connellsville Coke—There is no change and prices remain the same as last week, furnace coke on contract selling at $1.65@1.85 and foundry at $2.10@2.25 at oven. Some new contracts were taken during the week and several sales of spot coke were made at a trifle under the regular price. The *Courier* gives the production in both regions at 198,239 tons.

Shipments amounted to 7649 cars as follows: To Pittsburg, 3151; to points west of Pittsburg, 4050; to points east of Connellsville, 448 cars.

Foreign Coal Trade

United States Coal Exports—Exports of coal from the United States, eight months ended Aug. 31, long tons, together with coal furnished to steamships in foreign trade:

	1907.	1908.	Changes.
Anthracite.....	1,811,062	1,825,902	I. 14,840
Bituminous	6,792,022	5,856,077	D. 935,945
Total exports..	8,603,084	7,681,979	D. 921,105
Steamer coal....	3,779,112	3,854,411	I. 75,299
Total coal.....	12,382,196	11,536,390	D. 845,806
Coke.....	594,165	404,013	D. 190,152

Canada was the chief customer, taking 6,483,331 tons of the coal exported this year.

United States Coal Imports—Imports of coal into the United States, eight months ended Aug. 31, long tons:

	1907.	1908.	Changes.
Anthracite.....	132	15,023	I. 14,891
Bituminous.....	1,318,793	1,015,301	D. 303,492
Total coal.....	1,318,925	1,030,324	D. 288,601
Coke.....	90,186	81,492	D. 8,694

Canada supplied this year 701,310 tons of coal and nearly all the coke; Australia, 276,838 tons of coal. Imports were chiefly on the Pacific Coast.

French Coal Production—Official reports give the production of coal in France for the half-year ended June 30 as follows, in metric tons:

	1907.	1908.	Changes.
Coal.....	17,722,280	18,116,143	I. 393,863
Lignite.....	367,438	383,499	I. 16,061
Total..	18,089,718	18,499,642	I. 409,924

The production this year is the largest on record for a half-year.

Welsh Coal Market—Messrs. Hull, Blyth & Co., London and Cardiff, report prices of Welsh coal as follows, on Sept. 26: Best Welsh steam, $3.78; seconds, $3.54; thirds, $3.30; dry coals, $3.60; best Monmouthshire, $3.30; seconds, $3.12; best small steam, $1.92; seconds, $1.56. All per long ton, f.o.b. shipping port.

Iron Trade Review

New York, Oct. 7—There is manifest little relief from the quiet which has settled down on the markets, and which will hardly be broken before election. Users of iron and steel are not disposed to order material ahead further than is required by their immediate needs.

In pig iron small sales of foundry have been made, and there is some inquiry for basic. Southern furnaces seem to be better supplied with orders than those at the North. No attempt to advance prices for early delivery is possible in the face of the large idle capacity.

Structural material shows a little more movement, but it is chiefly in inquiries and negotiations. Railroad orders are still small, being limited to some bridge work. Orders for rails do not come, and complaint is made that specifications on contracts are slow. There is some movement in light rails and some cutting in prices.

It is reported that the Steel Corporation has taken a contract for 56,000 tons of sheet-bars for delivery in Great Britain. Price is not given; but taking current quotations there, it works out about $17.50 or $18 at mill in Pittsburg district. This is over $9 below the domestic price.

Baltimore

Oct. 6—Exports for the week included 1267 tons steel billets to Liverpool, and 461,771 lb. tin scrap to Rotterdam.

Birmingham

Oct. 5—Southern manufacturers of pig iron are confident that the market will shortly improve. Expecting a strong demand and having already accepted orders for considerable iron to be delivered during the last quarter of the year, efforts are being made to get every possible furnace in shape for operation. Three furnaces are to start by Oct. 10 and two others by the last of the month. There is very little iron to be seen in furnace yards. Deliveries are being kept up. That there is some hesitation until after the election appears, however, to be a universal opinion.

Quotations are firm; No. 2 foundry is $12.50@13. There are no sales of any consequence being made just now, the demand being in small lots for immediate delivery.

Chicago

Oct. 5—The iron market continues quiet. Sales are limited to small lots for delivery this year. A few contracts are being made for 1909 business at $13 Birmingham for Southern No. 2 ($17.35 Chicago), and $17 for Northern No. 2. On last-quarter business 50c. less obtains. These figures are generally on small lots; on a large sale they doubtless would be shaded considerably.

Notwithstanding increased production, Northern iron runs more steadily as to sales and terms of delivery than Southern.

In iron and steel products there is a fair market, with structural steel and heavy rails still light. Coke remains firm at $4.90 for first-class Connellsville, but with light sales.

Philadelphia

Oct. 7—Furnace representatives agree in saying that there are more inquiries for pig iron on the market this week than there has been for months. The discouraging feature incident to it is that the lots asked for are small in amount. The situation at the foundries and mills is not overencouraging for the placing of large orders. Southern competition is not seriously felt. The price for No. 2 X is $16. Basic sales are quietly made.

Steel Billets—A further increase in demand for early delivery of small lots is reported.

Bars—There is a struggle for the restricted volume of business transacted. The city trade has further improved. Blacksmithing and small shop demand is noticeably stronger.

Pittsburg

Oct. 6—All hope as to a general improvement in the iron and steel trade before election has been abandoned by well-informed men. There are a few who still give out encouraging information, but it cannot be based on tangible grounds. It was expected that the railroads would start things going early this month by placing large orders for steel rails and equipment, but so far they have not shown any signs of coming into the market. Consumers continue to place orders for various lines of finished material for immediate requirements and these orders are keeping the mills running to about the same capacity as for several weeks past. There is no change in the operations of the Carnegie Steel Company. The big order for sheet-bars for export has not resulted in the starting of the idle steel plant at Mingo Junction, as expected, and the present works are said to be able to take care of all the new business going. The National Tube Company is operating to about 70 per cent. of capacity. The American Sheet and Tin Plate Company is not operating quite 50 per cent. of its work.

Pig Iron—The market has not been in as bad shape for many years. No sales are recorded this week and but few inquiries are reported. Representatives of large producers and selling agencies agree that prices have sagged. The Pittsburg Steel Company does not admit that it bought any iron during the past few weeks or that it will come into the market. It is generally believed, however, that this company is negotiating to close a deal for 150,000 tons a year of basic pig iron for a period of from three to five years. If the transaction is made it will go to the Shenango Furnace Company. The number of blast furnaces in the Shenango and Mahoning valleys has been increased to 21, of which 12 are running.

Prices are nominally as follows: Standard bessemer, $15; malleable bessemer, $14.50; basic, $14.25; No. 2 foundry, $14.50; gray forge, $13.50, all f.o.b. Valley furnaces. It is certain that all of these prices could be shaded.

Steel—Some sales of billets are recorded, but all were for small lots for prompt delivery. Prices remain unchanged at $25, Pittsburg. Sheet-bars are $27.50; plates, 1.60c.; merchant-steel bars, 1.40 cents.

Sheets—The market is fairly active. Prices firm, 2.50c. being quoted for black sheets and 3.55c. for galvanized for No. 28 gage.

Ferro-Manganese—A number of good inquiries are in the market, one calling for 700 tons for delivery during the next five months. Prices are firm at $45@46 per ton, Pittsburg.

Metal Market

Gold and Silver Exports and Imports

NEW YORK, Oct. 7.

At all U. S. Ports in August and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Aug. 1908..	$ 6,597,101	$ 4,257,255	Exp. $ 2,339,846
" 1907..	4,596,879	3,223,772	" 1,373,107
Year 1908..	64,960,348	33,614,330	" 31,346,018
" 1907..	48,375,977	28,103,201	" 20,272,776
Silver:			
Aug. 1908..	4,130,853	3,194,426	Exp. 936,427
" 1907..	6,748,085	4,882,622	" 1,865,463
Year 1908..	34,576,144	27,375,355	" 7,200,789
" 1907..	41,922,336	30,665,458	" 11,256,878

Exports of specie from New York week ended Oct. 3: Gold, none; silver, $806.139, to London and Paris. Imports: Gold, $144.-850, from the West Indies and Panama; silver, $95,163, from Mexico and South America.

Specie holdings of the leading banks of the world, Oct. 3, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$311,896,300
England	$190,087,725	.....	190,087,725
France	648,284,785	$179,031,660	827,316,445
Germany	179,045,000	74,295,000	253,340,000
Spain	78,620,000	169,045,000	247,665,000
Netherlands	38,848,000	20,476,000	59,324,000
Belgium	20,080,000	10,040,000	30,120,000
Italy	185,185,000	22,500,000	207,685,000
Russia	600,260,000	36,285,000	636,545,000
Aust.-Hungary	242,725,000	65,185,000	307,910,000
Sweden	20,160,000	.....	20,160,000
Norway	8,145,000	.....	8,145,000
Switzerland	23,020,000	.....	23,020,000

The New York banks do not separate gold and silver. The foreign statements are from the *Commercial and Financial Chronicle* of New York.

Silver Market

SILVER AND STERLING EXCHANGE.

Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
1	4.8630	51⅝	23 1/16	5	4.8610	51⅞	23 1/16
2	4.8625	51⅝	23¾	6	4.8630	51¾	23⅞
3	4.8630	51⅝	23 1/16	7	4.8640	51⅞	23 1/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Messrs. Pixley & Abell report silver shipments from London to the East for the year to Sept. 24:

	1907.	1908.	Changes.
India	£8,975,154	£6,882,913	D. £2,092,241
China	.....	516,400	I. 516,400
Straits	625,950	112,385	D. 513,565
Total	£9,601,104	£7,511,698	D. £2,089,406

Imports for the week, £4000 from Mexico, £8000 from the West Indies and £164,000 from New York; £176,000 in all. Exports, £325,850 to India.

The outlook for silver, while showing as yet no speculative tendencies for a rise, is regarded as more steady and there seems to be less effort now to depress the price than has been apparent for some months past; the feeling is more cheerful.

Copper, Tin, Lead and Zinc

DAILY PRICES OF METALS.

Oct.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
1	13⅜ @13⅝	13¼ @13⅜	59⅞	29½	4.42½ @4.47½	4.75 @4.80	4.60 @4.65
2	13⅜ @13⅝	13¼ @13⅜	59⅝	29½	4.42½ @4.47½	4.75 @4.80	4.60 @4.65
3	13⅜ @13⅝	13¼ @13⅜	....	29½	4.42½ @4.47½	4.75 @4.80	4.60 @4.65
5	13⅜ @13⅝	13¼ @13⅜	59 1/16	29⅜	4.42½ @4.47½	4.75 @4.80	4.60 @4.65
6	13⅜ @13⅝	13⅛ @13⅜	59⅞	29½	4.42½ @4 47½	4.75 @4.80	4.60 @4.65
7	13⅜ @13⅝	13⅛ @13⅜	59 1/16	29⅜	4.42½ @4.47½	4.75 @4 80	4.60 @4.65

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The market has been devoid of interest throughout the week. There has been no material business from Europe where trade, generally, is hesitating on account of political developments. Domestic consumers are supplied for the next few weeks and inclined to wait until after election before entering into further commitments. Still, here and there, there is some belated buying of goodly quantities, but only of electrolytic, the market for Lake being almost stagnant and nominal. One lot was sold at 13⅝c., which represents the top of the market. In spite of the dullness the sentiment continues optimistic. The market closes at 13⅜@13⅝c. for Lake copper; 13⅛@13⅜c. for electrolytic in ingots, cakes and wirebars. The average of the week for casting copper is 13@13⅛ cents.

The upward tendency in the London market received a severe shock on the first of the month when the publication of the statistics disclosed an increase in the visible supplies for the second half of September of 1800 tons; but considering this and the subsequent upheaval in the speculative markets owing to political causes, the market held its own very well, closing steady at £59 13s. 9d. for spot, £60 10s. for three months.

Refined and manufactured sorts we quote: English tough, £63 10s.; best selected, £62 10s.@£63 10s.; strong sheets, £74 10s.@75 10s.

Manufactured Copper—Sheets, cold-rolled, 19c. per lb.; hot-rolled, 18c. Copper wire, 14¾c. base, carload lots at mill.

Tin—There were no special features to the London market and in consequence it hardly fluctuated. The close is cabled as firm at £134 5s. for spot, £135 12s. 6d. for three months.

The domestic market has been steady and transactions between traders continued. The consumption of tin leaves still a great deal to be desired, and for that reason no interest at all is taken in future delivery by the users of this metal. Spot tin at the close can be bought at about 29⅝c. per pound.

Statistics for the month of September show an increase in the visible supplies of 1400 tons.

Receipts of tin at Pacific Coast ports for the eight months ended Aug. 31 were 1678 long tons in 1907, and 1343 tons in 1908; a decrease of 335 tons.

Lead—There is a great deal of pressure to sell on the part of the Missouri producers and dealers, but orders are few and far between. The market has eased off further and closes weak at 4.40@4.45c. New York.

At St. Louis lead is dull and salable only in a retail way. Missouri brands can be had at 4.32½c., East St. Louis.

A squeeze of the shorts in London, timed during a period of small arrivals from Australia and Spain, resulted in a sharp advance, and the market closes firm at £13 11s. 3d. for Spanish lead, £13 13s. 9d. for English lead.

Spelter—Nothing of importance has transpired. Buyers are holding off for the time being, but on the other hand sellers are well supplied with orders and are not offering. The close is steady at 4.75@4.80c. New York, 4.60@4.65c. St. Louis.

The London market is unchanged at £19 15s. for good ordinaries, £20 for specials.

Zinc Sheets—Base price is 7c. f.o.b. La Salle-Peru, Ill., less 8 per cent.

German Zinc Trade—Paul Speier, Breslau reports imports and exports of spelter and zinc products in Germany, eight months ended Aug. 31, metric tons.

	Imports. 1907.	Imports. 1908.	Exports. 1907.	Exports. 1908.
Spelter	20,415	18,554	40,873	43,064
Zinc sheets	80	248	12,741	10,758
Zinc scrap	716	1,078	4,750	3,691
Zinc dust	646	762	1,462	1,640
Zinc pigments	5,493	4,902	18,741	17,307
Zinc ore	115,398	127,353	21,703	23,715

Zinc pigments include zinc white and zinc sulphide.

Other Metals

Antimony—The market is weak and there is a pressure to sell. A number of dealers unloaded at low prices during the week. Quotations are 8@8¼c. for Cookson's, 7¾@7⅞c. for Hallett's and 7½@7⅝c. for ordinary brands.

Aluminum—Ingots, American No. 1, in large quantities, 33c. per lb. Rods and wire, 38c. base; sheets, 40c. base.

Cadmium—In 100-lb. lots, $1.25 per lb., at Cleveland, Ohio.

The production of cadmium in Silesia, Germany, in the half-year ended June 30 was 15,901 kg., a decrease of 692 kg. from last year.

Nickel—According to size of lot and terms of sale, 40@50c., New York.

Quicksilver—New York price is higher, at $46 per flask for large lots; small orders depend on size and conditions. San Francisco nominal, about $43 for domestic orders, and $41 for export. London price is again higher at £8 10s. per flask, but £8 7s. 6d. is done with jobbers.

Platinum—Quotations are $22.50 for hard platinum, $20 for ordinary and $16 for scrap.

Imports and Exports of Metals

Exports and imports of metals in the United States for the eight months ended Aug. 31 are reported as follows, in the measures usual in the trade:

	Exports.	Imports.	Excess.
Copper, long tons	215,361	51,800	Exp. 163,561
Copper, 1907	112,649	86,127	Exp. 26,522
Tin, long tons	156	23,441	Imp. 23,285
Tin, 1907	399	28,694	Imp. 28,295
Lead, short tons	47,606	72,033	Imp. 24,427
Lead, 1907	30,053	49,289	Imp. 19,236
Spelter, sh. tons	2,111	503	Exp. 1,608
Spelter, 1907	391	924	Imp. 533
Nickel, lb	7,406,645	11,849,238	Imp. 4,442,593
Nickel, 1907	6,584,699	12,698,671	Imp. 6,113,972
Antimony, lb	.....	5,291,489	Imp. 5,291,489
Antimony, 1907	.....	5,598,118	Imp. 5,598,118
Platinum, oz	... .	19,385	Imp. 19,385
Platinum, 1907	..... .	51,300	Imp. 51,300
Quicksilver, lb	109,936	.....	Exp. 109,936
Quicksilver, '07	522,250	....	Exp. 522,250
Aluminum, value	$267,524	.....	Exp. $267,524
Aluminum, 1907	237,556	.....	Exp. 237,556

Copper, lead and nickel include the metal contents of ores, matte, bullion, etc. The exports given include re-exports of foreign material. Zinc dross exported, 15,805,362 lb. in 1907, and 12,859,411 lb. in 1908. Zinc ore exported, 12,141 tons in 1907, and 18,887 tons in 1908. Zinc ore imported, 16,624 tons calamine and 13,681 tons other ores; 30,305 tons in all, in 1908; not reported in 1907. Antimony ore imported, 2,253,851 lb. in 1907, and 974,732 lb. this year.

Missouri Ore Market

Joplin, Mo., Oct. 3—The highest price paid for zinc ore was $40.50, the assay base opened the week at $38 per ton of 60 per cent. zinc, dropping to $37 Thursday and closing the week at $36 for best grade ores. One remarkable point of the market was a base offering of $38.50 for ore heavy in iron, the penalties on which would bring it to a low price even at that. Silicate sold as high as $26, on a base of $20 per ton of 40 per cent. zinc. The average price, all grades, was $34.84. The lead-ore market, in proportion to the pig-lead market, is the lowest in years, having dropped back to the old scale of the Picher Lead Company in vogue in the early days of mining. The highest price was $54, while a large amount of the best ore brought only $53 and down to $52. The average price, all grades, is $53.64 per ton.

Following are the shipments of zinc and lead ore from the district for the week ended Oct. 3:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	3,024,930	557,520	$69,500
Joplin	2,250,060	290,120	49,387
Galena	863,940	85,520	17,838
Oronogo	677,850	1,090	12,361
Alba-Neck	613,820	.....	11,048
Spurgeon	473,600	67,460	9,031
Prosperity	262,580	53,420	6,166
Aurora	377,780	.....	6,108
Granby	470,000	17,000	5,990
Duenweg	200,730	64,270	5,346
Miami	235,050	.....	2,820
Badger	125,850	.....	2,328
Quapaw	130,050	.....	2,210
Carl Junction	116,910	.....	2,163
Zincite	84,030	7,100	1,660
Wentworth	103,120	.....	1,404
Cave Springs	66,410	.....	1,195
Carthage	62,340	.....	1,122
Peoria	30,430	.....	304
Totals	10,169,480	1,143,440	$207,981
40 weeks	382,177,200	57,929,820	$8,054,913

Zinc value, the week, $177,189; 40 weeks, $6,451,861
Lead value, the week, 30,792; 40 weeks, 1,603,052

Average prices of ores in the Joplin market by months have been, per short ton, as follows:

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1907.	1908.	1907.	1908.	1907.	1908.
January	$46.90	$37.60	$45.84	$35.56	$83.58	$46.88
February	48.30	36.63	47.11	34.92	84.58	49.72
March	49.75	36.19	48.66	34.19	82.75	49.90
April	49.25	35.40	48.24	34.08	79.76	52.47
May	46.90	34.19	45.98	33.39	79.56	56.05
June	47.00	33.06	44.82	32.07	73.66	60.48
July	46.80	34.55	45.79	31.67	58.18	59.90
August	44.56	36.53	43.22	33.42	59.54	60.34
September	41.00	37.63	40.11	34.44	53.52	54.59
October	41.75	.....	39.83	.....	51.40	.....
November	38.60	.....	35.19	.....	43.40	.....
December	31.50	.....	30.87	.....	37.71	.....
Year	$44.36	.....	$43.68	.....	$68.90	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Wisconsin Ore Market

Platteville, Wis., Oct. 3—For the week ended Sept. 26 base price for zinc ore was $38; highest price for lead ore, $55 per ton. The highest price paid for zinc ore this week was $39, on a basis of $38 per ton of 60 per cent. zinc. The best price paid for lead ore was $55 per ton.

Shipments from the district, two weeks ended Oct. 3:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Benton	1,207,380	63,390	.....
Cuba City	903,380	88,200	.....
Hazel Green	742,690	80,000	.....
Platteville	592,170	45,000	236,300
Days Siding	425,750	.....	.....
Rewey	197,600	.....	.....
Galena	420,000	.....	.....
Livingston	178,500	.....	.....
Dodgeville	.....	150,000	.....
Highland	499,600	.....	.....
Linden	229,300	.....	.....
Harker	128,230	.....	.....
Total	5,524,300	426,590	236,300
Year to Oct. 10	76,450,801	8,370,525	1,888,504

Shipments to Electrostatic Separator, Platteville, two weeks, 282,482 lb.; to Joplin Separator Works, Galena, 722,900 lb.; to Enterprise Roaster, Platteville, 396,800 lb. zinc concentrates.

Chemicals

New York, Oct. 7—The general trade shows some improvement and inquiries are coming in more freely. Present prices are firm.

Arsenic—The market is inclined to be weak and buyers are timid. Prices are 3⅛@3¼c. per lb. in carloads.

Copper Sulphate—Demand is light and business small. Prices unchanged at $4.65 per 100 lb. for carloads and up to $4.90 for smaller lots.

Nitrate of Soda—Messrs. Mortimer & Wisner, New York, report the statistics of nitrate of soda in the United States on Oct. 1 as follows, in long tons:

	1907.	1908.	Changes.
Stocks, Jan. 1	13,050	5,900	D. 7,150
Imports, 9 months	244,445	211,650	D. 32,795
Total Supplies	257,495	217,550	D. 39,945
Deliveries, 9 months	251,895	197,750	D. 54,145
Stocks, Oct. 1	5,600	19,800	I. 14,200
Afloat for U. S. ports	85,000	90,000	I. 5,000

Quantities afloat include all cargoes known and due to arrive before Jan. 15 next.

Imports and Exports—The imports and exports of chemicals and raw materials in the United States eight months ended Aug. 31 were as follows:

	Imports.	Exports.	Excess.
Copper sulphate, lb	.....	6,953,660	E. 6,953,660
Bleaching powder, lb	45,461,124	80,031	I. 45,381,093
Potash salts, lb	139,729,119	734,514	I. 138,994,605
Soda salts, lb	7,365,272	464,269	I. 6,901,003
Acetate of lime, lb	.....	41,202,145	E. 41,202,145
Nitrate of soda, tons	198,094	5,471	I. 192,623
Phosphates, tons	17,227	883,952	E. 866,725
Sulphur, tons	17,806	13,553	I. 4,253
Pyrites, tons	464,944	.....	I. 464,944

Estimating sulphur contents of pyrites, the total sulphur imported this year was approximately 202,784 long tons.

Mining Stocks

New York, Oct. 7—The general stock markets have been irregular, with small changes. The close sees a heavy market due to large sales of stocks on foreign account; the European bourses being disturbed by the troubles in the Balkans, which, it is feared, will cause diplomatic complications and possibly war. These sales reacted on New York, and the Exchange today is rather weak and pessimistic.

There was one sale of Homestake, of South Dakota, this week, 100 shares changing hands at $88.25 per share.

The Curb market was rather dull and irregular. Copper stocks were not espe-

cially active. Orphan Copper, which sold up to $8.37½ last week, was quoted at $2.62½ today, on small sales. Cobalt shares were fairly active.

Boston

Oct. 6—Another week of a gradual hardening of prices is to be reported in the mining-share list. The announcement of the Calumet & Hecla decision in the United States Court, of Michigan, proved to be a fillip to stocks Monday, when a period of old-time buoyancy was manifested, particularly in the issues in which Calumet & Hecla interests figure. Calumet itself jumped up $40 to $680 per share reacting but $10. Osceola shot up to $124.50, reacting to $118.50 tonight, which is $12.50 above the price of a week ago. Centennial rose $4.50 to $36.50, losing $1.75 of it, and Allouez rose $5.50 to $39.50. Lake Copper rose $2.75 to $14.75.

Amalgamated advanced $3.37½ to $76.62½, closing at $75.75 tonight. Arizona Commercial has been a distinctive feature, having risen $3.87½ to $34. Copper Range rose $2.50 to $75. Champion Copper directors have declared another $1 dividend making three thus far this year, against $10 paid in 1907. North Butte spurted almost $4 to $83.75, with $1 setback. There is always a broad market for the so-called Cole-Ryan stocks, owing to Western buying.

Ahmeek, a Bigelow property, shot up to $120, almost a $20 gain in a day. Davis-Daly has been conspicuous with a sharp advance to $3.75, assessment paid.

STOCK QUOTATIONS

NEW YORK	Oct. 6	BOSTON	Oct. 6
Name of Comp.	Clg.	Name of Comp.	Clg.
Alaska Mine	⅛	Adventure	8⅝
Amalgamated	76	Allouez	37
Anaconda	43⅞	Am. Zinc	‡23
Balaklala	‡2 1/16	Arcadian	3⅝
British Col. Cop.	6½	Arizona Com	33⅞
Butte & London		Atlantic	18¼
Butte Coalition	25	Bingham	30
Colonial Silver	⅛	Boston Con	13½
Cum. Ely Mining	7¾	Calumet & Ariz.	117
Davis Daly	2	Calumet & Hecla	670
Dominion Cop	⅛	Centennial	34¾
Douglas Copper	3½	Con. Mercur	.40
El Rayo	3½	Copper Range	74½
Florence	3½	Daly-West	9½
Foster Cobalt	.60	Franklin	12½
Furnace Creek	.16	Greene—Can.	10¼
Giroux	4½	Isle Royal	23½
Gold Hill	1/16	La Salle	14½
Goldfield Con.	5¾	Mass	6
Granby	102	Michigan	14
Greene Gold	⅛	Mohawk	63½
Greene G. & S	⅛	Nevada	16½
Greenw'r & D.Val.	$.75	North Butte	82⅞
Guanajuato	1⅝	Old Colony	.60
Guggen. Exp.	‡160	Old Dominion	43½
Hanapah	$.20	Osceola	119
McKinley Dar	92	Parrot	26
Micmac	2⅛	Quincy	94
Mines Co. of Am.	1⅝	Rhode Island	4
Mitchell Mining	⅛	Santa Fe	1¾
Mont. Sho.C	⅞	Shannon	14⅞
Nev. Utah M. & S	3	Superior	26¼
Newhouse M. & S	5⅛	Tamarack	73
Nipissing Mines	8⅜	Trinity	17¾
Old Hundred	⅛	United Cop., com.	11⅝
Silver Queen	1.16	U. S. Oil	25⅝
Stewart	⅛	U. S. Smg. & Ref.	39½
Tennessee Cop'r.	41⅝	U.S.Sm. & Re.,pd*	44½
Tri-Bullion	1/16	Utah Con	43
Union Copper	⅛	Victoria	4½
Utah Apex	4⅛	Winona	5⅛
Utah Copper	41	Wolverine	137
Yukon Gold	4⅛	Wyandotte	2⅞

*Ex. Div. †Ex. Rights. ‡Last quotation.

N. Y. INDUSTRIAL	
Am. Agri. Chem.	27¾
Am. Smelt. & Ref.	87
Am. Sm. & Ref., pf.	104
Bethlehem Steel	22¾
Colo. Fuel & Iron	35⅛
Federal M. & S., pf.	‡85
Inter. Salt	18½
National Lead	83½
National Lead, pf.	102⅛
Pittsburg Coal	‡10⅛
Republic I. & S.	22
Republic I. & S., pf.	79
Sloss-Sheffield	60⅛
Standard Oil	625
U. S. Red. & Ref.	‡9
U. S. Steel	45⅛
U. S. Steel, pf	109
Va. Car. Chem.	33⅛

BOSTON CURB	
Ahmeek	‡120
Black Mt	‡3⅝
East Butte	8¼
Hancock Con	6
Keweenaw	4
Majestic	.75
Raven	.88
Shawmut	.19
Superior & Pitts.	14
Troy Man	‡.30

ST. LOUIS	Oct. 3	
N. of Com.	High.	Low.
Adams	40	.30
Am. Nettie	.04	.03
Center Cr'k	2.25	1.50
Cent. C. & C.	68.00	66.00
C.C. & C. pd.	75.00	73.00
Cent. Oil	105.00	100.00
Columbia	5.00	4.00
Con. Coal	21.00	19.00
Doe Run	125.00	110.00
Gra. Bimet.	.20	.18
St. Joe	15.00	12.50

LONDON	Oct. 7
Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton's Ind.	0 1 0
Camp Bird	0 13 0
Esperanza	3 4 4½
Tomboy	1 2 6
El Oro	1 5 0
Oroville	0 11 6

Cabled through Wm. P. Bonbright & Co., N. Y.

NEVADA STOCKS. Oct. 7.
Furnished by Weir Bros. & Co., New York.

Name of Comp.	Clg.	Name of Comp.	Clg.
COMSTOCK STOCKS		Silver Pick	.16
Belcher	.23	St. Ives	.25
Best & Belcher	.43	Triangle	04
Caledonia	.13	BULLFROG STOCKS	
Challar	.17	Bullfrog Mining	.03
Comstock	.24	Bullfrog Nat. B.	.04
Con. Cal. & Va.	.70	Gibraltar	03
Crown Point	.30	Gold Bar	03
Exchequer	.30	Homestake King.	.22
Gould & Curry	.16	Montgomery Mt.	.07
Hale & Norcross	.38	Mont. Shoshone C.	.75
Mexican	.70	Original Bullfrog.	.01
Ophir	1.89	Tramp Cons	.16
Overman	.14	MANHAT'N STOCKS	
Potosi	.18	Manhattan Cons.	.05
Savage	.28	Manhat'n Dexter.	.04
Sierra Nevada	.20	Jumping Jack	.03
Union	.28	Stray Dog	.03
Utah	.05	MISCELLANEOUS	
Yellow Jacket	.50	Golden Boulder	.06
TONOPAH STOCKS		Bonnie Clare	.05
Belmont	1.20	Lee Gold Grotto	...
Extension	.66	Nevada Hills	1.00
Golden Anchor	.01	Nevada Smelting	.87½
Jim Butler	.24	Pittsburgh S. Pk.	.93
MacNamara	.51	Round Mt. Sphinx	.15
Midway	.30		
Montana	.95		
North Star	.06		
Tono'h Mine of N.	6.75		
West End Con	.50		
GOLDFI'D STOCKS			
Adams	.04		
Atlanta	.21		
Booth	.37		
Columbia Mt	.21		
Comb. Frac	1.19		
Cracker Jack	.06		
Dia'dfield B. B. C.	.14½		
Goldfield Belmont	.05		
Goldfield Daisy	.75		
Great Bend	.30		
Jumbo Extension	.34		
Katherine	...		
Kendall	.14		
Lone Star	.08		
May Queen	.06		
Oro	.10		
Red Hill	.21		
Roanoke	...		
Sandstorm	.23		

COLO. SPRINGS	Oct. 3
Name of Comp.	Clg.
Acacia	6⅜
Black Bell	....
C. C. Con	3¾
Dante	....
Doctor Jack Pot	6½
Elkton	66
El Paso	38¾
Findlay	20
Gold Dollar	‡7
Gold Sovereign	3
Isabella	25½
Index	....
Jennie Sample	‡2⅜
Jerry Johnson	‡4
Mary McKinney	30
Pharmacist	3½
Portland	1.05
Un. Gold Mines	4
Vindicator	‡83½
Work	7

Assessments

Company.	Delinq.	Sale.	Amt.
Bald Eagle, Cal.	Sept. 25	Oct. 15	$0.10
Belcher, Nev.	Sept. 15	Oct. 6	0.10
Birchville, Cal.	Nov. 2	Nov. 20	0.03
Brunswick Con., Cal	Oct. 20	Nov. 19	0.03
Bullion, Nev.	Oct. 29	Nov. 20	0.05
Caledonia, Nev.	Oct. 21	Nov. 11	0.05
California, Cal.	Oct. 17	Nov. 7	0.02
Colo. Hydraulic, Cal.	Sept. 23	Oct. 17	0.025
Con. Imperial, Nev.	Sept. 29	Oct. 22	0.01
Gould & Curry, Nev.	Oct. 7	Oct. 29	0.10
Graciosa Oil, Cal.	Sept. 16	Oct. 14	0.10
Lady Washington, Nev.	Oct. 26	Nov. 16	0.05
Massasoit, Utah	Oct. 17	Nov. 5	0.01
Nonpareil, Utah	Sept. 15	Oct. 15	0.01
Old Mission Oil, Cal	Sept. 18	Oct. 8	0.075
Oro Cobre, Cal.	Oct. 3	Oct. 26	0.02
Overman, Nev.	Sept. 23	Oct. 14	0.05
Sierra Nevada, Nev.	Oct. 14	Nov. 4	0.10
Wheeler, Utah	Oct. 5	Oct. 23	0.01

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1907.	1908.	1907.	1908.
January	68.673	55.678	31.769	25.738
February	68.835	56.000	31.852	25.855
March	67.519	55.365	31.325	25.570
April	65.462	54.505	30.253	25.133
May	65.971	52.795	30.471	24.377
June	67.090	53.663	30.893	24.760
July	68.144	53.115	31.366	24.514
August	68.745	51.683	31.637	23.858
September	67.792	51.720	31.313	23.877
October	62.435	.....	28.863	.....
November	58.677	.....	27.154	.....
December	54.565	.....	25.362	
Year	65.327	.....	30.188	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1907.	1908.	1907.	1908.	1907.	1908.
January	24.404	13.726	24.825	13.901	106.739	62.386
February	24.869	12.905	25.236	13.098	107.356	58.786
March	25.065	12.704	25.560	12.875	106.594	58.761
April	24.224	12.743	25.260	12.928	98.625	58.331
May	24.048	12.598	25.072	12.788	102.375	57.387
June	21.665	12.675	24.140	12.877	97.272	57.842
July	22.130	12.702	21.923	12.933	95.016	57.989
August	18.356	13.462	19.255	13.639	79.679	60.500
September	15.565	13.388	16.047	13.600	68.375	60.338
October	13.169	.....	13.551	.....	60.717	.....
November	13.391	.....	13.870	.....	61.226	.....
December	13.163	.....	13.393	.....	60.113	.....
Year	20.004	.....	20.661	.....	87.007	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1907.	1908.	Month.	1907.	1908.
January	41.548	27.380	July	41.091	29.207
February	42.102	28.978	August	37.667	29.942
March	41.313	30.577	September	36.689	28.815
April	40.938	31.702	October	32.620	.....
May	43.149	30.015	November	30.833	.....
June	42.120	28.024	December	27.925	.....
			Av. year.	38.166	.....

Prices are in cents per pound.

LEAD

Month.	New York.		London.	
	1907.	1908.	1907.	1908.
January	6.000	3.691	19.828	14.469
February	6.000	3.725	19.531	14.250
March	6.000	3.838	19.703	13.975
April	6.000	3.993	19.975	13.469
May	6.000	4.253	19.688	12.938
June	5.760	4.466	20.188	12.600
July	5.288	4.447	20.350	13.000
August	5.250	4.580	19.063	13.375
September	4.813	4.515	19.775	13.125
October	4.750	.....	18.531	.....
November	4.376	.....	17.281	.....
December	3.658	.....	14.500	.....
Year	5.325	.....	19.034	.....

New York, cents per pound. London, pounds sterling per long ton.

SPELTER

MONTH.	New York.		St. Louis.		London.	
	1907.	1908.	1907.	1908.	1907.	1908.
January	6.732	4.513	6.582	4.363	27.125	20.563
February	6.814	4.788	6.664	4.638	25.938	20.875
March	6.837	4.665	6.687	4.527	26.094	21.075
April	6.685	4.645	6.535	4.495	25.900	21.344
May	6.441	4.608	6.291	4.458	25.563	19.906
June	6.419	4.543	6.269	4.393	25.469	19.000
July	6.072	4.485	5.922	4.338	23.850	19.031
August	5.701	4.702	5.551	4.556	21.969	19.350
September	5.236	4.769	5.086	4.619	21.050	19.563
October	5.430	.....	5.280	.....	21.781	.....
November	4.925	.....	4.775	.....	21.438	.....
December	4.254	.....	4.104	.....	20.075	.....
Year	5.962	.....	5.812	.....	23.771	.....

New York and St. Louis, cents per pound. London in pounds sterling per long ton.